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INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

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PREFACE

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Director of Indonesian Center for Agricultural Library and Technology Dissemination

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EXTENSION ACTIVITIES; FARMING SYSTEMS; FARMERS; ADVISORY OFFICERS; INNOVATION ADOPTION; DECISION MAKING; MARGINAL LAND.

Marginal land in Indonesia is potential for agribusiness development, but it has not been well managed. At present, 17.1 million hectares or 22.8% of dry-land areas are cultivated for agriculture. Objectives of this research were to analyze the factors affecting: (1) perceptions of farmers towards extension, (2) farmers' perceptions on innovation characteristics, and (3) farmers' decision in adopting the technology. The research used an explanatory survey method. Units of analysis were individuals, and the sample farmers were the respondents. The population in this study was all farmers in the villages of the Districts of Talaga (Cianjur Regency) and Jatiwangi (Garut Regency). Number of samples was determined using Slovin's formula with total samples of 302 respondents. Sampling method of this research employed by using stratified random method. Data were collected from December 2008 to March 2009. Analyses of the data consisted of: (1) Descriptive data analysis, i.e. frequency distribution and Odds ratio, and (2) inferential data analysis, i.e. Pearson correlation, multiple regression, and path analysis. Results of the study showed that: (1) Factors influencing the perception of adopting-farmers toward extension were mobility, intelligence, and risk-taking levels, and cooperation, while those for non-adopting farmers were purchasing power, cooperation, exposure to the media, and availability of financial facilities; (2) Factors influencing the perception of adopting-farmers' on innovation characteristics were income level, land use, attitude toward change, competence and role of extension agents, while those for non-adopting farmers were intelligence, risk-taking, cosmopolite levels, inputs availability, and marketing facilities; (3) Factors affecting farmers' decisions to adopt technology for adopting farmers were relative advantage, compatibility of technology, and their perceptions on media influence/interpersonal information, while those for non-adopting farmers were conformity and complexity of technology, and their perceptions on media influence/interpersonal information.

C30 DOCUMENTATION AND INFORMATION

002 SUMARDJO
Use of information system based on information and communication technology for vegetable farmers empowerment. ***Manfaat sistem informasi berbasis teknologi informasi dan komunikasi untuk keberdayaan petani sayur*** / Sumardjo (Institut Pertanian Bogor (Indonesia). Pusat Kajian Resolusi Konflik dan Pemberdayaan LPPM); Lubis, D.P.; Mulyani, E.S.; Mulyandari, R.S.H. *Informatika Pertanian* (Indonesia). ISSN 0852-1743 (2011) v. 20(1) p. 14-29, 8 ill., 6 tables; 21 ref.

FARMERS; VEGETABLES; INNOVATION; INFORMATION TECHNOLOGY; COMMUNICATION TECHNOLOGY; INFORMATION SYSTEMS.

Information and communication technology (ICT) have some important roles supporting farmer in decision-making process through information system development. The research

have four objectives, there are: 1) Analyzing the benefit of information system based on ICT; 2) Assessing the constraints of information system based on ICT; 3) Analyzing the factors influencing information system development based on ICT; and 4) designing the strategy of information system based on ICT to support the vegetable farmer empowerment. The research was conducted in Cianjur (West Java) and Batu (East Java) on July to November 2010. Data collection techniques used in this study was convenience sampling derived from the 200 respondents with closed and semi-open questionnaires and processed by using Likert scale. Quantitative data were analyzed statistically based on correlation and t-test. The benefits of agricultural information system based on information technology is to open opportunities as possible for farmers to market information and agricultural technology and accelerate the process of communication and information access, thus increasing the network of communication and bargaining position of farmers. Many constraints that stakeholders known in ICT utilization can be divided into five major categories, there are management, infrastructure, human resource development, culture, and content. Knowledge, attitude, and capabilities in ICT utilization, ICT ownership, education level, age, and social status are the dominant factors influencing the accessibilities of agricultural information system based on ICT. The dominant factors influencing the vegetable farmer empowerment are the intensity and the level of ICT utilization. Mechanism of maintenance and provision the relevant and timely of content within related institution including socialization and assistance by extension workers/local communication institution through multi-step-flow communication was needed to optimize the ICT utilization, so that it can support the empowerment process of vegetable farmers.

E10 AGRICULTURAL ECONOMICS AND POLICIES

003 DRAJAT, B.

Opportunities for increasing domestic added value of cocoa through trade regulation. ***Peluang peningkatan nilai tambah kakao domestik melalui regulasi perdagangan*** / Drajat, B. (Riset Perkebunan Nusantara (P.T.), Bogor (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 130-149, 7 tables; 11 ref.

COCOA BEANS; ECONOMICS; TRADE; MARKETS;VALUE ADDED; INDONESIA.

The operational companies on cocoa bean trading in Indonesia relates to the liberalization policy on trade and invesment in Indonesia permits for multinational companies to operate in Indonesia and liable to buy cocoa bean directly from farmers. The problem encountered is the domestic market liberalization gives rise to changes in market power and results in the dominant position of multinational companies. This research aimed at (i) analyzing the impact of the exercise of market power by cocoa multinational company, (ii) analyzing the possibility of deregulation of cocoa bean domestic trading, and (iii) estimating the potential increase in added value of cocoa down-stream industry as a result of deregulation. Some steps of research conducted included (i) desk research, (ii) field survey by interviewing samples of farmers, traders, exporters, processors, as well as other business participants, (iii) special interviews with key persons related to regulation as well as deregulation of domestic trade and down-stream industry development, and (iv) focussed group discussion involving related stakeholders of cocoa. The results showed that the impact of the execise of market power by multinational companies refers to the impact of the exercise of market power by multinational companies refers to the decreasing market shares of national companies from 2007 to 2009. Based on the market power by multinational companies in one side and the lack of down-stream industry development in the other side, there is a possibility to deregulate the above policy by continuing the new regulation (export tax of cocoa beans, directing multinational exporters toward downstream industry by partnership with domestic-

idle capacity processing industry and import tariff by partnership with domestic-idle capacity processing industry and import tariff escalation for processed cocoa). By the new regulation, the opportunity to increase domestic added value becomes greater. This cocoa down-stream industry development will increase the potential domestic added value at least 10%.

E11 LAND ECONOMICS AND POLICIES

004 IDJUDIN, A.A.
Role of land conservation in plantation management. ***Peranan konservasi lahan dalam pengelolaan perkebunan*** / Idjudin, A.A. (Balai Penelitian Tanah, Bogor (Indonesia)). *Jurnal Sumberdaya Lahan* (Indonesia). ISSN 1907-0799 (2011) v. 5(2) p. 103-116, 4 tables; 22 ref.

PLANTATIONS; MANAGEMENT; LAND MANAGEMENT; SLOPING LAND; CONSERVATION TILLAGE; AGROFORESTRY; CROPPING SYSTEMS; EROSION CONTROL.

The main problem of agricultural activities in the sloping upland area is no adequate soil conservation practices that resulting soil erosion. Soil erosion causes agricultural land degradation which reduces the physical, chemical, and biological soil properties and decreases land productivities. Soil erosion is very harmful to agricultural land productivities, because of the loss of fertile topsoil in a relatively short time which decreases soil fertility and productivity. The role of conservation techniques are the way of soil conservation, which have three principles of definitions, i.e. a) to protect the soil against soil degradation, b) to improve the degraded soil, and c) to make the soil more fertile. Soil conservation practice in the field has used two methods, i.e. mechanical conservation method and vegetative conservation method. Mechanical conservation method is the earth embankments constructed across the slope to intercept surface run off and to protect soil erosion (soil cultivation along the contour, constructed terraces, contour bank, waterways ditch, drop structure, silt pit, checkdam, gully plug, etc). While the vegetative methode is aim at reducing kinetic energy of raindrops on the soil surface, reducing run off velocity, increasing infiltration rate and reducing soil water contents. The effectiveness of soil conservation techniques in upland areas on soil erosion and land productivity is different in each location. This is because of the difference of land capability (specific site, soil behavior and properties, and the climate). Farmers' motivation as the user of the soil conservation technologies is included as one on the determinant factors of the successfulness in improving degraded upland and increasing land productivity.

E12 LABOUR AND EMPLOYMENT

005 MAHYUDDIN
Elasticity of labour demand and sector real wages rigidity in South Sulawesi Province [Indonesia]. ***Elastisitas permintaan tenaga kerja dan kekakuan upah riil sektoral di Sulawesi Selatan*** / Mahyuddin (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Pertanian); Zain, M.M. *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2010) v. 28(2) p. 133-151, 3 ill., 4 tables; 17 ref.

LABOUR; LABOUR REQUIREMENTS; ELASTICITY; REMUNERATION; ECONOMIC GROWTH; SULAWESI.

This study aimed at measuring the elasticity of labor demand and the level of real wage rigidity as well as studying the dynamic behavior of real wages in South Sulawesi. The

elasticity of labor demand were analyzed using an OLS method, the level of wage rigidity was analyzed using an error correction model (ECM), and dynamic behavior of real wages was analyzed using an impulse response function (IRF). The results showed that the elasticity of labor demand was inelastic to the real wages in all sectors. The elasticity of labor demand of the changes in a variety of sources of economic growth was also inelastic in all sectors. The employment opportunities in agricultural and industrial sectors were more responding to the increasing exports and investment, while other sectors more responding to the increased private consumption. Labor productivity and imports significantly reduced employment opportunities in all sectors. The industrial sector had a more real wages rigidity compared to the real wages in agricultural sector and others. Real wages rigidity of industrial sector took about 4.6 years to reach equilibrium conditions, while the agricultural sector only took about 1.5 years and other sectors needed about 2.2 years. The increased competitiveness of various exported commodities and the creation of a conducive-investment climate were a strategic step to expand employment opportunities. In addition, the policy such as setting the regional minimum wage (UMR) more suitable to market wages was also considered as a strategy to reduce wage rigidity in South Sulawesi.

E14 DEVELOPMENT ECONOMICS AND POLICIES

006 ISHAK, A.

Perception and the adoption of the application of System of Rice Intensification (SRI) by rice farmers in the District of Seluma [Indonesia]. ***Persepsi dan tingkat adopsi petani padi terhadap penerapan System of Rice Intensification (SRI) di Desa Bukit Peninjauan I, Kecamatan Sukaraja, Kabupaten Seluma*** / Ishak, A.; Afrizon (Balai Pengkajian Teknologi Pertanian Bengkulu (Indonesia)). *Informatika Pertanian* (Indonesia). ISSN 0852-1743 (2011) v. 20(2) p. 76-80, 4 tables; 9 ref.

RICE; INNOVATION ADOPTION; PUBLIC OPINION; FARMERS; TECHNOLOGY TRANSFER; PRODUCTIVITY.

The adoption of agricultural technologies by farmers is largely determined by the needs and capabilities of farmers to implement these technologies in the field. System of Rice Intensification (SRI) is an approach in rice culture techniques that can improve efficiency and productivity of irrigated lowland rice. To find out farmers perception and adoption of SRI in Seluma Regency, Bengkulu Province, a research has been conducted in the Bukit Peninjauan I, Sukaraja Subregency. This village is the only village in the Seluma Regency which began developing the SRI technology since 2009. The experiment was conducted in March to April 2011 with a census of 65 farmer members of Bumi Sari Farmer Group who implementing SRI program that organized by Agriculture Office of Seluma Regency. Descriptive data were processed to determine the perceptions and level of adoption of SRI, while the factors that influence farmers' adoption were analyzed by logistic regression. The results showed that all of the farmers had a good perception of SRI, but the technology adoption of farmers was still low because 69.23% of SRI technology components had not been adopted by farmers as recommended. Of the six components of the SRI technology, i.e. (1) age of young seedlings, (2) one seed per hole, (3) spacing, (4) irrigation, (5) mechanical tillage, and (6) intake of organic matter, only spacing and irrigation were adopted. The low adoption of SRI caused by the high risk to be faced such as seeds moved into the field was still too young (age 8-15 days after seedling), and pest and disease threats to the plant that only using one seed per planting hole. Additionally mechanical tillage and intake of organic material was not adopted because of increasing farmers' labor and cost of rice production. Farmers' adoption of technology is not affected significantly by age, educational level, the area of land tenure and income level.

E16 PRODUCTION ECONOMICS

007 JAMAL, H.

Determinants for soybean productivity in tidal land of Tanjung Jabung Timur District, Jambi Province [Indonesia]. ***Faktor penentu produktivitas kedelai di lahan pasang surut Kabupaten Tanjung Jabung Timur, Provinsi Jambi*** / Jamal, H. (Badan Penelitian dan Pengembangan Daerah Provinsi Jambi (Indonesia)); Jumakir. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia) ISSN 1410-959X (2011) v. 14(1) p. 49-62, 1 ill., 18 ref. Appendices.

GLYCINE MAX; SOYBEANS; PRODUCTIVITY; CROPPING PATTERNS; TECHNOLOGY TRANSFER.

This study aims at identifying the determinants of the soybean productivity grown on tidal land in a soybean production centre of Jambi Province. The data were collected through a survey on 60 respondents on Bandar Jaya District and Marga Mulya Village in the planting season of the year 2009. The data were analyzed using multiple regression models. The result showed that the variable application of technologies that have real significance (alpha = 0.05) to explain soybean productivity (Y) is the use of recommended seed variety (X1), the use of fertilizer (X3), and the use of manure (X4) with the regression equation Y = -772 + 131X1+ 110X3) + 77X4. This equation resulted in determination coefficient (R^2) = 0.487. Social economic factors which have real significance (α = 0.05) in explaining the level of technology implementation (Y) is farmer's knowledge (X1), plantation area of soybean (X3), availability of production materials (X4) and participation in the PTT activities of the year 2008 (D2) with the regression equation Y = 0.47 + 0.64X1 - 0.483 + 0.33X4 + 0.60D2. This regression equation resulted in determination coefficient (R2) = 0.664. Conclusion of the research showed that the use of recommended seed varieties was the most dominant determinant factor in the effort to increase soybean productivity and increased farmers' knowledge as a key factor in the application of cultivation technology of soybean in the research location.

E20 ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

008 ABIDIN, Z.

Cost structure analysis, profit and break event point of seed production of rice at Konawe Regency, Southeast Sulawesi Provinve [Indonesia]. ***Analisis struktur biaya, keuntungan dan titik impas usaha penangkaran benih padi di Kabupaten Konawe, Sulawesi Tenggara*** / Abidin, Z. (Balai Pengkajian Teknologi Pertanian Sulawesi Tenggara, Kendari (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(2) p. 92-99, 3 tables; 14 ref.

RICE; SEED PRODUCTION; COST BENEFIT ANALYSIS; BREAK EVEN POINTS; PROFITS; SULAWESI.

Good seed is one of the important factors that contributes to increase paddy productivity. To attract farmer to use good seed, growing seed production should be done, but farmer will produce certified seed if this farming give benefit. Research was conducted to determine cost structure, benefits and break even point of seed production farming. Research was carried out in Karandu Village, Wawotobi Subdistrict Konawe Regency. Up to 85 farmer families with 74 ha are involved. Results showed that the cost structure to produce certified seed was 54% for labour, 24% for processing and 22% for input production such as seed, fertilizers

and pesticides. Seed production gave benefit of Rp 9,412,100/ha. Furthermore, break even point with production side was 1,644 kg/ha, break even point with price side was Rp 1,089/kg. To reach regional minimum wage of Southeast Sulawesi Province, the area of seed production for each farmer should be managed about 0.30 ha. Seed production was suitable if production did not decrease less than 30%, price less than 30% and cost production did not increase more than 30%. Seed production based on community will become the important factor to support national rice production increase (P2BN).

009 ABIDIN, Z.

Income and break even point analysis of hybrid rice farming at Southeast Sulawesi [Indonesia]. ***Kajian laba dan titik impas usaha tani padi hibrida di Sulawesi Tenggara*** / Abidin, Z. (Balai Pengkajian Teknologi Pertanian Sulawesi Tenggara, Kendari (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(3) p. 160-170, 5 tables; 20 ref.

RICE; HYBRIDS; FARMING SYSTEMS; PROFITABILITY; PRODUCTIVITY; MARKETING; FARM INCOME; COST BENEFIT ANALYSIS; SULAWESI.

Hybrid rice is a proceed technology to increase the domestic paddy productivity. This research was conducted to know the benefits and break even point (BEP) of hybrid rice development in Southeast Sulawesi Province by using a survey method by involving 120 respondents that had planted the hybrid rice in Konawe, South Konawe and Kolaka Districts. The survey showed that the average of hybrid rice productivity around 4.2 t/ha. However, this was still lower than the potential productivity of hybrid rice about 12 t/ha. Financial analysis showed that hybrid rice were feasible with the value of B/C 0.91 and gave benefit about Rp 4,029,000/ha. Break even point from production side (BEVP) and BEP from price side (BEVPc) were 2.2 t/ha and Rp 1,048/kg, respectively. If hybrid rice productivity only 4.2 t/ha, changing farming from inbreed rice to hybrid rice would cause losses. Hybrid rice would give benefit higher than inbreed rice if the productivity minimum 4.8 t/ha. Sensitivity analysis showed that hybrid rice was sensitive for increasing an input price. Increasing input price about 5%, even still gave a benefit, but farmer could not sustain nor enjoyed to adopt a hybrid rice, because the value of B/C less than 1. Even though output price increased 20%, farmer could not adopt a hybrid rice if the input price increased more than 15%. Hybrid rice were potential to develop in Southeast Sulawesi, but government should prepare some regulation such as technical assistance for farmer, seed subsidies, fertilizer subsidies, land and social suitable mapping, and market insurance.

010 KUSNADI, N.

Rice farming efficiency analysis in some rice producing areas in Indonesia. ***Analisis efisiensi usaha tani padi di beberapa sentra produksi padi di Indonesia*** / Kusnadi, N.; Tinaprilla, N. (Institut Pertanian Bogor (Indonesia). Fakultas Ekonomi dan Manajemen); Susilowati, S.H.; Purwoto, A. *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2011) v. 29(1) p. 25-48, 2 ill., 4 tables; 19 ref.

ORYZA SATIVA; FARMING SYSTEMS; PRODUCTIVITY; PRODUCTION INCREASE; FARMERS; INDONESIA.

Production efficiency improvement to increase national rice production becomes an important alternative at present since the farm area extension alternatives seems to be more difficult to conduct. Land availability for rice farming is limited and land conversion from agriculture to non agriculture purposes is increasing because of many reasons. This paper

aims at analyzing the level of technical production efficiency in rice producing provinces and analyzing factors influencing its technical efficiency. The results indicated that rice farming in five provinces was efficient with an average of technical efficiency of 91.86%. Factors influencing production efficiency were farmers' ages and education levels, dummy variables of season, farmers group, land owner status, rice farming location, and number of parcel of land ownership.

011 SAHARA, D.

Efficiency study of profits in irrigated rice farming in Southeast Sulawesi (Indonesia). ***Kajian efisiensi keuntungan usaha tani lahan sawah di Sulawesi Tenggara*** / Sahara, D. (Balai Pengkajian Teknologi Pertanian Sulawesi Tenggara, Kendari (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(2) p. 108-120, 6 tables; 17 ref. Appendix.

ORYZA SATIVA; IRRIGATED RICE; VEGETABLES; FARMING SYSTEMS; EFFICIENCY; PROFITABILITY; RAINFED FARMING; SULAWESI.

Study was conducted in Konawe as irrigated land and South Konawe as rainfed lowland centers. Farming done by farmers is rice farming and vegetable farming. The study aims at determining the level of efficiency profit and the sources of inefficiency, and knowing elasticity of profits and finding loss profits. Efficiency profit analysis was by using a translog profit function with multiple input and multiple outputs. The results showed that the most lowland farmers had not reached the maximum profit, and the factors that caused inefficiencies in the irrigation area was farming experience, education, share of nonfarm income and family size, while in rainfed land inefficiencies caused by a number of family members. Inefficient farmers who suffered losses greater profit, and changes in profitability were more responsive to changes in rice prices and labor wage compared with the price of vegetables and fertilizer prices. Policy implications that could be given rice price policy and wage incentives were still necessary for rice farmers and improving farmer education.

012 SAMANHUDI

Implementation of field school for integrated crop management (SL-PTT) on soybean in Central Java [Indonesia]. ***Implementasi program SL-PTT kedelai di Jawa Tengah*** / Samanhudi; Sutrisno, J.; Yunus, A.; Sholahuddin; Sutopo (Universitas Sebelas Maret Surakarta (Indonesia)). Fakultas Pertanian). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 232-244, 2 tables; 7 ref. 633.31/.4/SEM/a

GLYCINE MAX; INTEGRATED PLANT PRODUCTION; PRODUCTIVITY; SEED TECHNOLOGY; CROP MANAGEMENT.

Implementation of field school for integrated crop management (SL-PTT) on soybean in Central Java in 2008 is generally successfully. However, most of it has not been able to increase productivity. Soybean productivity through SL-PTT in 2008 was lower than in previous years, below the target set by the government at 16.5 t/ha. The main obstacle is due to water shortages and unintensive crop management. For future development of soybean cultivation, the availability of improved seed is absolutely necessary. Therefore, soybean seed technology must be developed. In addition, crop rotation and cropping settings.

013 SAPTANA

Production technical efficiency analysis of great red chili farming and farmers behaviour in dealing with the risks. ***Analisis efisiensi teknis produksi usaha tani cabai merah besar dan perilaku petani dalam menghadapi risiko*** / Saptana (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)); Daryanto, H.K.; Kuntjoro. *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2010) v. 28(2) p. 153-188, 5 tables; 23 ref.

CAPSICUM ANNUUM; FARMING SYSTEMS; PRODUCTION; PRODUCTION FUNCTIONS; FARMERS; BEHAVIOUR; RISK.

This study aims at: (a) analyzing the factors that influence the production of great red chili farming, (b) analyzing major factors affecting the technical inefficiency of great red chili farming, and (c) analyzing the behavior of large red chili farmers in dealing with the risks of production and prices. Results showed that most variables, both technical and socio-economic variables in the model, had expected signs significantly. Some of the inputs reduced risk, such as use of seeds, N fertilizer, PPC and hired labor, while some other inputs generated. Average TE values either without or with entering element of risk were each of 0.83 and 0.82, but with different TE distribution. Total farmers achieving more than 0.80 of TE were 68.68% without including the risks, and 71.71% by incorporating risk. Great red chili farmers on prices were risk takers. It implies that the farmers with TE value less than 0.80 are the focused target of upgrading technical and managerial capabilities. Technology design and application in the future can be carried out by reducing excessive use of inputs and increasing limiting factors.

014 TAHIR, A.G.

Production efficiency analysis of soybean farming systems in South Sulawesi [Indonesia]. ***Analisis efisiensi produksi sistem usaha tani kedelai di Sulawesi Selatan*** / Tahir, A.G. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)); Darwanto, D.H.; Mulyo, J.H.; Jamhari. *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2010) v. 28(2) p. 133-151, 6 tables; 10 ref.

GLYCINE MAX; FARMING SYSTEMS; PRODUCTION INCREASE; ECONOMIC ANALYSIS; SULAWESI.

Soybean is the third important food commodity, after rice and corn, with the increasing trend of demand of 8.74%/year. Therefore, the imported soybean is maintained at a high level (1.2 million ton in 2008). The research on efficiency of soybean farm production system was conducted in three districts in South Sulawesi Province, namely Bone, Soppeng and Wajo. The locations were selected using a purposive sampling technique considering that those three areas are the soybean producing centers. This research uses a Cobb-Douglas Production Function applying an ordinary least square (OLS) method and profit derived from Cobb-Douglas production function with a unit output price Cobb-Douglas profit function (UOP-CDFF) technique. The result shows that the technical factors influencing the increase soybean production are the farmers' experience, family labor, urea, KCl, organic fertilizer, ownership dummy (profit sharing), the dummy of soybeans variety (high variety), dummy of planting distance (40 cm x 15 cm and 40 cm x 10 cm), and also the land type of dummy. Amount of the three production input types (fertilizers) could be increased to improve the production. Moreover, positive factors influencing the TER (technical efficiency rating) in soybean farming are land size, farmers' age, educational background, and farmers' experience. Efficiency could still be achieved by decreasing the use of part time labor (nonfamily member) to maximize the income, and by reducing the use of soybean seeds, part time labor and land size to increase the profit.

015 WINARDI

Opportunity of conservation farming implementation for cropping gambier in West Sumatra [Indonesia]. ***Peluang penerapan usaha tani konservasi untuk pertanaman gambir di Sumatera Barat*** / Winardi (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). *Jurnal Sumberdaya Lahan* (Indonesia). ISSN 1907-0799 (2011) v. 5(2) p. 95-102, 4 tables; 14 ref.

UNCARIA GAMBIR; CULTIVATION; CONSERVATION TILLAGE; LAND MANAGEMENT; FARMING SYSTEMS; SUMATRA.

Gambier is one of the West Sumatra specific leading commodity from plantation subsector. The total area of gambier cultivation in West Sumatra, currently, covers 18,204 ha with a production of 10,114 t/year. Gambier planting areas are concentrated in two regions, namely District of Limapuluh Kota and District of Pesisir Selatan. Gambier is generally cultivated by traditional farmers both in protected forest and community forest. Those areas usually have steep slopes, thus unsuitable for cultivation area. Land capability classification in this area ranges from Class V to Class VIII. The low ability of farmers, whether in farming technique or economic sector, cause very simple technology of gambier cultivation was implemented. Such circumstances likely causing land degradation on gambier plantation. Conservation farming with agroforestry practices has an opportunity to be developed because of low cost and potentially increase farmer income and welfare. The conservation farming has been practiced by some gambier farmers.

E21 AGRO-INDUSTRY

016 ALIUDIN

Efficiency and income of palm sugar small business: a case study of palm sugar small business in Cimenga Village, Cijaku District, Lebak Regency, Banten Province [Indonesia]. ***Efisiensi dan pendapatan usaha gula aren cetak: kasus pada perajin gula aren cetak di Desa Cimenga, Kecamatan Cijaku, Kabupaten Lebak, Provinsi Banten*** / Aliudin; Sariyoga, S.; Anggraeni, D. (Universitas Sultan Ageng Tirtayasa, Serang-Banten (Indonesia). Fakultas Pertanian). *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2011) v. 29(1) p. 71-85, 5 tables; 10 ref.

SUGAR; SUGAR PALMS; AGROINDUSTRIAL SECTOR; INCOME; VALUE ADDED; PRODUCTION; ELASTICITY; ECONOMIC ANALYSIS.

This study aims at estimating efficiency of using production factors, added value, and profit of palm sugar small business. A survey method is employed in this study with a purposive sampling of the study site, namely Cimenga Village as the palm sugar producing center in Lebak Regency, Banten Province. Total production of palm sugar in this village is 364.20 tons per year produced by the small business of 876 units with total labor of 1,408 persons. The sample consists of 54 producers. Economic efficiency is estimated using a Cobb-Douglas production function and the added value analysis is estimated using Hayami method. Results of this study indicated that allocation of production factors in Cimenga, i.e. raw materials, labor, and fuel were inefficient. Efficiency of raw material, labors, and fuels was positive but less than 1 indicating that use of raw materials, labor and fuel are still responsive. The palm sugar producers gave added value of 74%. Average net income per production cycle was Rp 29,823.81 for each producer. Carrying out this business in groups would enhance efficiency because they can substitute production factors. It would also improve added value and profit.

E50 RURAL SOCIOLOGY AND SOCIAL SECURITY

017 BUHARMAN B.

Performance of the farmer welfare indicator in West Sumatra [Indonesia]. ***Dinamika indikator kesejahteraan petani pedesaan di Sumatera Barat*** / Buharman B.; Nurnayetti (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(2) p. 121-130, 7 tables; 10 ref.

FARMERS; SOCIAL WELFARE; SUMATRA.

An assessment of farmer welfare indicator in the rural was conducted to find out the farmer welfare production centers of rice, vegetable, and rubber as source of the farmer income. The assessment was conducted on six villages in three districts. There were 15 farmers as respondent in each village on remote area and 15 respondents on non-remote area. The respondents divided into three stratum which depended on land size: large, medium, and small. Cross tabulation was conducted on value of indicator welfare, include: (i) trend on income, (ii) food expenditure, (iii) household purchase, (iv) food security of household, and (v) term of trade of the farmers. The result showed that the farmer income had been being low in period 2007-2009, especially from rice farm. Contribution of rice farm on income was about 6.9-70.5%, vegetables 53.7-100%, and rubber 42.2-90.6%. On the same time, contribution of food expenditure was 41.7-80.4%, 22.9-67.1%, and 43.1-76.0%, respectively. Purchase capacities of rice farm households were 0.45-4.01, vegetable farm 1.15-8.68, and rubber farm 0.53-4.13 in all stratum and villages. Food security of rice farm household was deficit (< 1), on other hand, vegetable and rubber household surplus (> 1). According to five welfare indicators, the farmer welfare had been significantly still low in three years. These conditions were caused by infrastructures scale, productive asset, human resources, technology and information access, and capital.

E70 TRADE, MARKETING AND DISTRIBUTION

018 ASMARA, A.

International oil price volatility and its impact on manufacturing sector and Indonesian macroeconomic performance. ***Volatilitas harga minyak dunia dan dampaknya terhadap kinerja sektor industri pengolahan dan makroekonomi Indonesia*** / Asmara, A.; Oktaviani, R.; Kuntjoro; Firdaus, M. (Institut Pertanian Bogor (Indonesia). Fakultas Ekonomi Manajemen). *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2011) v. 29(1) p. 49-69, 2 ill., 4 tables; 19 ref. Appendices.

OILS; PRICES; VOLATILITY; MACROECONOMIC ANALYSIS; PROCESSING; INDUSTRY; INDONESIA.

Fluctuations of oil prices generally affect performance of manufacturing sectors and macroeconomic condition in Indonesia. The purpose of this study is to analyze the volatility of international oil prices and its impact on manufacturing sectors and macroeconomic performance. The analytical methods used are the ARCH-GARCH model and Recursive Dynamic CGE. Volatility of international oil prices tends to vary over time (time varying) and increases. In addition, the impacts also vary among industries. Volatility of world oil prices has a tendency to provide negative influence on the Indonesian manufacturing sectors and macroeconomic performance. Nevertheless, advanced durability against shock volatility performed by the manufacturing sector tending to have linkages with the agricultural sector, such as processed food, fertilizer and pesticide.

019 SWASTIKA, D.K.S.

Gap analysis of supply and demand of corn forage by synchronization approach to production center, feed plant, animal population in Indonesia. ***Analisis senjang penawaran dan permintaan jagung pakan dengan pendekatan sinkronisasi sentra produksi, pabrik pakan, dan populasi ternak di Indonesia*** / Swastika, D.K.S.; Agustian, A. (Pusat Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)); Sudaryanto, T. *Informatika Pertanian* (Indonesia) ISSN 0852-1743 (2011) v. 20(2) p. 65-75, 2 ill., 14 tables; 26 ref.

MAIZE; FEEDS; SUPPLY BALANCE; ANIMAL POPULATION; FORAGE; PRODUCTION.

The demand for feed maize continues to increase each year in line with the development of livestock industry. Feed mills often complain of difficulties in getting maize, but farmers also often complain of difficulties to sell their maize. This prompted the authors to assess the gap of supply and demand for feed maize by synchronization approach to production centers, feed mills, and livestock population. The results showed that: (l) out of 10 provinces of maize production centers, 7 of which are the centers of feed mills; (2) the demand for maize for manufactured feed in 2010 is 36.28% above the demand base on livestock population; and (3) in 2020, the demand for maize for manufactured feed is projected up to 28.52% above that of using population approach. If the production of manufactured feed is adjusted to meet only the existing livestock, the need for feed maize is much smaller. There is an indication that the orientation of the feed mills is not only to meet domestic demand, but also for export. With the limited resources, especially domestic maize production, the manufactured feed should be focused to meet the domestic demand for feed, so that it would not interfere the development of domestic livestock industry.

020 YANTU, M.R.

Integration of cocoa bean at the rural markets in Central Sulawesi Province [Indonesia] with the world market. ***Integrasi pasar kakao biji perdesaan Sulawesi Tengah dengan pasar dunia*** / Yantu, M.R. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian); Juanda, B.; Siregar, H.; Gonarsyah, I.; Hadi, S. *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2010) v. 28(2) p. 201-225, 2 ill., 6 tables; 30 ref.

COCOA BEANS; DOMESTIC MARKETS; WORLD MARKETS; PRICES; MARKETING CHANNELS; ECONOMICS; SULAWESI.

This study were aimed (i) at estimating transmission elasticity of cocoa bean prices at the world market to the rural markets in Central Sulawesi Province; (ii) analyzing the integration of cocoa beans markets; and (iii) analyzing the degree integration. Data used were time-series data from 1985 to 2008, and primary data from the farmers and the traders. The results showed that the transmission of cocoa beans prices was unstable. Integration of cocoa bean price at rural markets to those in regency level was very weak and segmented. Conversely, integration degree of the market at regency level with that of export was highly significant, especially in the long run.

E71 INTERNATIONAL TRADE

021 MUSLIM, C.

Competitiveness of mangosteen, export promotion, marketing system, and stability in domestic market: a case study in Purwakarta Regency, West Java Province

(Indonesia). ***Daya saing komoditas promosi ekspor manggis, sistem pemasaran dan kemantapannya di dalam negeri: studi kasus di Kabupaten Purwakarta, Jawa Barat*** / Muslim, C.; Nurasa, T. (Pusat Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Jurnal Agro Ekonomi* (Indonesia). ISSN 0216-9053 (2011) v. 29(1) p. 87-111, 1 ill., 5 tables; 18 ref. Appendices.

MANGOSTEEN; EXPORTS; ECONOMIC COMPETITION; MARKETING; FARMING SYSTEMS; ECONOMIC ANALYSIS; JAVA.

Mangosteen export ranks first in that of fresh fruits. This fruit has comparative and competitive advantages for export markets. The research was conducted in September 2009 in Purwakarta Regency, West Java Province. Objectives of this study were: (i) to analyze financial feasibility of mangosteen farming, (ii) to analyze comparative and competitive advantages of mangosteen, and (iii) to assess the impacts of government policies and influence of input and output price changes on the competitiveness of mangosteen in Indonesia. Survey method using structured questionnaires was used in this study. Primary data were collected from 20 mangosteen farmers, 5 merchants, and 2 exporters. Secondary data were collected from relevant agencies. Comparative and competitive advantages were estimated using a policy analysis matrix (PAM). The results showed that profit of mangosteen farming could be determined after the sixth year after planting with production of 1.2 tons and profit of Rp 1.5 million/hectare. The highest production occurred in the 18th year with average production of 12.6 tons and benefit of Rp 68.5 million/hectare. Fruit production started decreasing in the 24th or 25th year. Results of PCR and ORC analyses showed values each of 0.40 and 0.19 implying that the mangosteen farming having competitive and comparative advantages. Government policy on tradable inputs offered incentives to the farmers indicated by NPCI value of 0.76, but it had negative impact on mangosteen price with NPCO value of 0.49. The government needed to pay attention to some indicators, such as those of trade and comparative and competitive advantages, so that the mangosteen farmers could gain benefit from them and got higher incomes.

F01 CROP HUSBANDRY

022 RUNTUNUWU, E.

Variations in planting time of rice in Kalimantan, Indonesia. ***Keragaman waktu tanam tanaman padi di Pulau Kalimantan*** / Runtunuwu, E.; Syahbuddin, H.; Ramadhani, F. (Balai Penelitian Agroklimat dan Hidrologi, Bogor (Indonesia)). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 8-14, 7 ill., 22 ref.

ORYZA SATIVA; PLANTING DATE; RAIN; KALIMANTAN.

Rice planting time varies among farming sites. This research was aimed at studying the variation in planting time especially in rainy season in Kalimantan. Planting time was determined using assumption as the time when 8% of paddy fields in a subdistrict had been planted. Analysis was done by using mean ten-days of planting area of each subdistrict during the period of 2000 - 2009 that was obtained from Central Bureau of Statistics Indonesia. The result showed that the farmers in Kalimantan started planting rice during the first and second ten-days of September each year. Peak time of rice planting varied among provinces, i.e., on October II/III (West Kalimantan), January I/II and June II/III (East Kalimantan), and March III/April I (South and Central Kalimantan). Data from this research could be used to calculate planting management at national level.

023 SANTOSO, B.B.

Yield of *Jatropha curcas* L. at different pruning time. ***Keragaan hasil jarak pagar (Jatropha curcas L.) pada berbagai umur pemangkasan*** / Santoso, B.B. (Universitas Mataram (Indonesia). Fakultas Pertanian). *Jurnal Agronomi Indonesia* (Indonesia) ISSN 2085-2916 (2012) v. 40(1) p. 69-76, 1 ill., 7 tables; 29 ref.

JATROPHA CURCAS; PRUNING; TIMING; CANOPY; YIELDS; LIPID CONTENT.

Seed and oil production of physic nut (*Jatropha curcas*) is the function of planting material, growing condition, and also canopy architecture maintenance. The objective of the research was to determine the effect of pruning time on yield of physic nut. An experiment was conducted from November 2007 to November 2010 in North Lombok, West Nusa Tenggara using Lombok Barat genotype. The experimental design was randomized block design with three replications. There were four treatments: a) without pruning, b) pruning at planting time, c) pruning of 1-year old trees at dormance period (after harvesting), and d) pruning of 2-years old trees at dormancy period (after harvesting). Results showed that development and maintenance of physic nut canopy is one of important agronomic practices to obtain high seed production. The best time for pruning during 3-years production cycle was at the end of harvest of 1-year old trees which could yield more than 4 tonnes seed/ha.

024 SEMBIRING, H.

Productivity improvement of new plant type of rice through the management of cultivation technique. ***Perbaikan produktivitas padi tipe baru melalui pengelolaan kultur teknis*** / Sembiring, H.; Wardana, I P. (Balai Besar Penelitian Tanaman Padi, Sukamandi, Subang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 136-143, 14 tables; 12 ref.

ORYZA SATIVA; NITROGEN FERTILIZERS; MICRONUTRIENT FERTILIZERS; APPLICATION RATES; SPACING; GROWTH; YIELD COMPONENTS; AGRONOMIC CHARACTERS; PRODUCTION INCREASE; YIELDS.

A field experiment was conducted at Sukamandi Experimental Farm. The objectives of the study were to identify growths and yield responses of NPT (new plant type of rice) lines to levels of N (nitrogen) and micro nutrients (Zn, Cu, S and Si) applications under different cultivation techniques. The trial was arranged in a split plot design with five replications. The main plot was five N fertilizer (urea) levels, the subplot was combinations between cultivation techniques and rates of urea + micronutrients applications. The result showed that combination of urea application at rate of 120 kg N/ha and the pair-rows (legowo) 2:1 planting gave the highest effect on plant height; however micronutrient application (Cu, Zn, S, Si and Mg) gave no significant effect. The highest grain yield was obtained in plots fertilized with urea at rate of 240 kg N/ha. The legowo 2:1 rows planting combined with micronutrient application did not increase grain yield significantly.

025 SUBIHARTA

Potency of groundnut local varieties of Sidoharjo and Blora supporting the fodder availability at dry farm. ***Potensi kacang tanah varietas lokal Sidoharjo dan Blora sebagai pakan sapi potong*** / Subiharta; Anwar, H. (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh,

N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 424-430, 5 tables; 13 ref. 633.31/.4/SEM/a

ARACHIS HYPOGAEA; BEEF CATTLE; CULTIVATION; TECHNOLOGY; GROWTH; AGRICULTURAL WASTES; ANIMAL FEEDING.

Blora Regency is known as peanut producer as well as highest population of cattle beef. Some problems faced by Blora Regency such as local peanut seed, and fodder limitation in dry season. The objective of the research was to study contribution of peanut straw to feed availability. The research was conducted at Tlogowungu Village, Japah District, Blora Regency in collaboration with 13 peanut farmers. Ten farmers received technological innovation of varieties, seed treatment, fertilization, and pre emergence herbicide grow at 32 ha areas. The rest 3 farmers as control, did not receive innovation. They planted local peanut variety in 0.5 area. The results indicated that plant height, number of branches and weight of straw of Sidoharjo local variety were higher than those of Blora local variety, that were 66.1 cm, 5.35 bar, 5.443.2 kg/ha and 56.5 cm, 4.5 bar, 2,484.0 kg/ha, respectively. The straw production of Sidoharjo variety could support requirement of fodder during 56.7 days and with 0.35 ha areas and population of cow 2,8 tail Blora local varieties could support during 25.8 days with sample given around 12 kg and the less of fodder added by 15 kg paddy hay. If the straw was sold with price Rp 3000/15 kg, incone obtained was Rp 381,024 (local Sidoharjo) and Rp 163,012.5 (local Blora).

026 TAUFIQ, A.

Verification of soybean production technology using integrated crop and land resource management approaches in swamp land of C type. ***Verifikasi teknologi produksi kedelai melalui pendekatan pengelolaan tanaman terpadu pada lahan pasang surut tipe C*** / Taufiq, A.; Wijanarko, A.; Fachrurrozi; Prahoro, C. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 144-159, 2 ill., 6 tables; 20 ref. 633.31/.4/SEM/a

GLYCINE MAX; TECHNOLOGY; CULTIVATION; CROP MANAGEMENT; SOIL FERTILITY; GROWTH; YIELDS; COST BENEFIT ANALYSIS; SWAMP SOILS.

Swamp land is potential for soybean development. Jambi Province is one of area of the soybean belt in Sumatra Island. Majority of soybean (54%) in Jambi is planted in swamp land area with productivity ranging from 1.0 to 1.3 t/ha. The objective of research was to verify the soybean production technology in swamp land of C type in Jambi that had been tailored. The research had been conducted at Harapan Makmur and Marga Mulya Villages, Rantau Rasau District and at Rantau Makmur Village, Berbak District during dry season 2009. Soybean planted on May 2009 and harvested on July 2009. The soybean production technology verified was composed based on integrated crop and land resource management approach. This research continued from 2007 and 2008. The soybean production technology consisted of Anjasmoro variety; planting distance of 40 cm x 15 cm, two seeds per hill, drainage canal made selectivelly every 3 m to 4 m interval, fertilizing with 200 kg/ha Phonska, soil amelioration with 1,000 kg/ha cow manure and 750 kg/ha dolomite, pest and disease control based on integrated pest management approach. Soil characteristics were soil pH 5.2-5.8, exchangeable Al 0-2 me/100 g, organic-C 1.55-2.79%, total N 0.13-0.21%, exchangeable K 0.09-0.17 me/100 g, Bray II extractable P 11.3-27.8 ppm P_2O_5 and HCl 25%

extractable P 15.5-36.4 mg P_2O_5/100 g. Research result showed that soybean yield in swamp land of C type in Jambi reached 2.77 t/ha or increased by 95% compared to yield at farmer level. The technology was economically feasible with B/C ratio of 1.68.

027 YULISMA

Growth and productivity of corn (*Zea mays* L.) on various plant spacing. *Pertumbuhan dan hasil beberapa varietas jagung pada berbagai jarak tanam* / Yulisma (Universitas Malikussaleh, Aceh Darussalam (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 196-203, 5 tables; 14 ref.

ZEA MAYS; VARIETIES; SPACING; GROWTH; YIELDS.

This study was aimed at determining the effect of varieties and spaces of planting on growth and yield of maize, using a split plot design with three replications. Main plots was V1 (Local), V2 (Bisma), V3 (Bisi 10) and V4 (P 21), and subplot was planting spacing, i.e. K1 (30 cm x 40 cm), K2 (40 cm x 40 cm), K3 (50 cm x 40 cm), K4 (60 cm x 40 cm), K5 (70 cm x 40 cm). Variety significantly affected plant height at the age of 2-8 weeks after planting (WAP), whereas the total leaf area was significantly affected on the age of 2, 4 and 6 WAP. Dry weight of plants was significantly affected at the age of 4 and 8 WAP. Net assimilation rate was significantly affected at the age of 2-4 WAP. Spacing treatments significantly affected plant height at the age of 4, 6 and 8 WAP. Grain yield increased from 1,081 kg to 5,249 kg/ha with an increase of plant spacing from 30 cm x 40 cm to 70 cm x 40 cm. Hybrid variety produced yield higher than that of open pollinated ones. The highest productivity as much as 7,994 kg/ha was obtained by hybrid P 21 with the plant spacing of 50 cm x 40 cm, followed by hybrid Bisi 10 (7,508 kg/ha), local variety (5,803 kg/ha), Bisma (5,345 kg/ha) with the same plant spacing of 50 cm x 40 cm.

028 ZAKARIA, A.K.

Level of adoption of soybean cultivation technology in the irrigated rice-field of Pasuruan Regency, East Java [Indonesia]. *Tingkat adopsi teknologi budi daya kedelai pada lahan sawah irigasi di Pasuruan, Jawa Timur* / Zakaria, A.K. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 180-185, 8 tables; 17 ref.

GLYCINE MAX; TECHNOLOGY TRANSFER; CULTIVATION; RICE FIELDS; IRRIGATION; FARMING SYSTEMS; COST BENEFIT ANALYSIS; JAVA.

Soybean is an important food crops that have a strategic role in the agricultural development of Indonesia. In the last two decades, the national soybean production had continued to decline due to mainly of the declining of the planting area, as a result of the reduced level of farmers' participations in soybean cultivation. The government had developed a strategic program to increase soybean production in order to meet the domestic needs through a technical aspects, and also the need of raising the participation of farmers. The research was conducted at two locations in Pasuruan Regency, East Java, in 2009, using survey method. Primary data was collected through interviews with 64 farmers as the respondents by giving a structured questionnaires. The data were arranged in a cross tabulation and analyzed to measure the feasibility of the farming based on the gross B/C ratio, profitability, BEP (break even point), and competitive advantage of soybean farming in paddy fields. The results showed that soybean farming in the research area was profitable with gross values of B/C 1.85 and 2.19, respectively, however, the recommended technology has not been fully

implemented by farmers. The present finding was also indicated that soybean cropping has a competitive advantage over maize.

F02 PLANT PROPAGATION

029 HAPSORO, D.

In vitro* shoot formation on sugarcane (*Saccharum officinarum* L.) callus as affected by benzyladenine concentrations. *Regenerasi in vitro tanaman tebu (Saccharum officinarum L.) dibutuhkan untuk mendukung program pemuliaan tanaman tebu / Hapsoro, D.; Febrianie, A.P.; Yusnita (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 56-61, 7 ill., 33 ref.

SACCHARUM OFFICINARUM; SHOOTS; MERISTEM CULTURE; IN VITRO; BA; CALLUS.

This research was conducted to study the effect of benzyl adenine on *in vitro* shoot formation from sugarcane callus. Leafrolls were cultured for 8 weeks on callus induction medium containing MS salts, 30 g/l sucrose, 150 ml/l coconut water, 100 mg/l myo-inositol, 0.1 mg/l thiamine-HCl, 0.5 mg/l pyridoxine-HCl, 0.5 mg/l nicotinic acid, 2 mg/l glycine, and 3 mg/l 2,4-D. Callus was then subjected to different concentrations of benzyl adenine (BA) (0, 0.5, 1, 2, and 2.5 mg/l) contained in MS media. The experiment showed that after 8 weeks in culture 2 and 2.5 mg/l BA led to the highest percentage of shoot formation (100%). The experiment also showed that addition of BA caused an increase in percentage of shoot formation, number of shoot per callus clumps, and average shoot length. In the range of 0-2.5 mg/l, the higher the concentrations of BA the more shoots and the longer shoots were produced. The highest number of shoots was recorded at BA 2.5 mg/l (36.4 shoots per callus clump) and the highest average shoot length was obtained at 2 and 2.5 mg/l BA, i.e. 2.25 and 2.3 cm, respectively. The shoot formation system was then applied to 12 sugarcane genotypes, resulting in statistically different response and producing substantial number of shoots, ranging from 29 to 41.33 shoots per clump.

030 KRISTINA, N.N.

In vitro* shoot induction of mistleteo fig (*Ficus deltoidea* Jack) in Murashige Skoog (MS) media with addition of BA and NAA. *Induksi tunas tabat barito (Ficus deltroidea Jack) secara in vitro menggunakan benzil adenin (BA) dan naphthalene acetic acid (NAA) / Kristina, N.N. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 33-39, 4 ill., 4 tables; 25 ref.

FICUS; SHOOTS; IN VITRO CULTURE; PLANT GROWTH SUBSTANCES; EXTRACTS; GROWTH.

Mistleteo fig (*Ficus deltoidea*) is one of endangered medicinal plants and used for female aphrodisiac. *In vitro* multiplication of the plant was done to find a number of shoots. This experiment was conducted in Tissue Culture Laboratory of Germplasm and Breeding of IMACRI, and aimed at finding best media for shoot multiplication. This experiment was carried out in three steps: step 1) shoot response in multiplication media using single cytokinin: MS + BA (0.5; 1.0; 1.5 and 2 mg/l); step 2) shoot response in multiplication media of combined cytokinin and auxin : MS + BA 0.5 mg/l + NAA 0.1 mg/l; MS + BA 0.5 mg/l + NAA 0.5 mg/l; MS + BA 1.0 mg/l + NAA 0.1 mg/l and MS + BA 1.0 + NAA 0.5

mg/l and step 3) viability and visualization of the shoots after subcultured in the same media. The experiment was arranged using completely randomized design with 5 replicates. The parameters observed were shoots and nodes, shoot height and performance. The results in the first step showed that MS + BA 0.5 mg/l media resulted in the highest number of shoots, but they were not significantly different in the number of nodes and shoots height. In the second step, the highest number of shoots was found using low concentration of auxin combined with low and high concentration of cytokinin. Best medium for number of nodes was MS with high concentration of BA combined with NAA. For shoot height, the best medium was MS + BA 0.1 mg/l + NAA 0.5 mg/l, but the shoots turned yellow. In the third step, after subcultured, the shoots originated from plant tips performed well, however, those taken from second and third inter nodes partially turned yellow.

031 LESTARI, E.G.

Gamma irradiation for somaclonal variation induction and *in vitro* selection using fusaric acid in raja bulu banana calli along with regeneration and plantlet acclimatization. ***Induksi keragaman somaklonal dengan iradiasi sinar gamma dan seleksi in vitro kalus pisang raja bulu menggunakan asam fusarat, serta regenerasi dan aklimatisasi planlet*** / Lestari, E.G.; Purnamaningsih, R.; Mariska, I.; Hutami, S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 411-417, 2 ill., 5 tables; 25 ref.

MUSA PARADISIACA; SOMACLONAL VARIATION; GAMMA IRRADIATION; SELECTION; IN VITRO; CALLUS; ADAPTATION; VITROPLANTS; REGENERATION; FUSARIUM OXYSPORUM.

Raja bulu banana is one of the most important bananas in Indonesia. However, this plant has low tolerance to wilt disease caused by *Fusarium oxysporum f. cubense*. Its mass cultivation is inhibited by the absence of variety tolerant to the disease. A wide range of genetic variability will be needed if selection for novel characters is to be conducted, especially when there is no source of resistant gene available for breeding materials. This research consisted of callus induction from primary explants, induction of somaclonal variation using gamma irradiation, and *in vitro* selection using fusaric acid, followed by regeneration and acclimatization of selected plantlets. The media applied for callus induction was MS (Murashige and Skoog, 1962) + 2,4-D 1 and 3 mg/l + NAA 0 and 0.1 mg/l and 2.4-D 5 mg/l + BA 0.5 mg/l + casein hidrolysate (CH) 500 mg/l. The applied gamma irradiation dosage were 0, 5.0, 7.5, 10 and 15 Gy. The irradiated calli was subsequently subcultured on selection media, i.e. MS containing fusaric acid at 30 and 45 mg/l. The living calli was then regenerated on media containing BA, TDZ, with or without proline and arginine. In addition, MS + kinetin 5 mg/l + IAA 0.2 mg/l was applied for shoot development. The result showed that the most suitable callus induction media for raja bulu banana was MS + 2,4-D 5 mg/l + BA 0.5 mg/l + CH 1500 mg/l. The gamma irradiation of 10 Gy produced somaclone lines which were able to proliferate bud nodules on selection media containing fusaric acid at 30 and 45 mg/l. The media used for shoot development was MS + kinetin 5 mg/l + IAA 0.2 mg/l. Plantlet obtained from the *in vitro* were then successfully acclimatized in the greenhouse.

032 POERBA, Y.S.

Effects of ethyl methane sulphonate (EMS) on growth of iles-iles (*Amorphophallus muelleri* Blume) *in vitro* culture. ***Pengaruh mutagen etil metan sulfonat (EMS) terhadap pertumbuhan kultur in vitro iles-iles (Amorphophallus muelleri Blume)*** / Poerba, Y.S.;

Leksonowati, A.; Martanti, D. (Pusat Penelitian Biologi-LIPI, Cibinong (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 419-425, 5 ill., 4 tables; 14 ref.

AMORPHOPHALLUS; IN VITRO CULTURE; INDUCED MUTATION; GROWTH; EMS.

Amorphophallus muelleri Blume (*Araceae*) is one of 27 Amorphophallus species occur wild in Indonesia (Sumatra, Java, Flores and Timor). The species is valued for its glucoman content for use in food industry (heathy diet food), paper industry, pharmacy and cosmetics. The cultivation of *A. muelleri* is hampered by limited genetic quality of seed. The species is triploid (2n=3x=39), the seed is developed apomictically and pollen production is low. The species is only propagated vegetatively. This may explain that the species is difficult to breed conventionally and genetic variability in the existing landraces cultivars is rather limited. Induced mutation using ethyl methan sulfonate is one of techniques to increase genetic variation. The present research is aimed at determining lethal dosage (LD) 50% and 75% of EMS and to study effects of EMS on growth of *A. muelleri in vitro* cultures for use in induced mutation program. Results of the experiment showed that LD_{50} and LD_{75} was observed at 0.875% EMS and 0.5% EMS, respectively. Number of shoot and percentage of rooting culture were decreasing as EMS level concentration increases.

F03 SEED PRODUCTION AND PROCESSING

033 BELO, S.M.

Decreasing seed viability of rice (*Oryza sativa* L.) by several rapid aging methods. *Penurunan viabilitas benih padi (Oryza sativa L.) melalui beberapa metode pengusangan cepat* / Belo, S.M. (Ministry of Agriculture and Fisheries East Timor, Dili Barat (Indonesia)). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 29-35, 1 ill., 3 tables; 21 ref.

ORYZA SATIVA; SEEDS; VIABILITY; AGING; ETHANOL; SOAKING; GERMINABILITY.

Availability of seed lots with different viabilities is very important as the material for invigoration studies. Accelerated or rapid aging methods is expected to serve seeds with different viabilities for those studies. The objective of this study was to obtain efficient seeds rapid aging method of rice seeds. The study consisted of three experiments, i.e. rapid aging with ethanol gas, soaking seed in liquid ethanol 96% and exposing seeds to 41°C temperature and ± 100% relative humidity. Each experiment was arranged in a randomized block design with single factor that was length of aging with three replications. There were eight rice varieties used in this study, i.e. three varieties of upland rice, two varieties of lowland rice, and three varieties of swamp rice. The results showed that the physical aging method could not produce reliable data due to fungus infection on the treated seed. Generally, 60% and 50% viabilities of rice seed could be obtain by ethanol gas treatment for 4.9 and 5.3 hours, as well as by liquid ethanol for 4.0 and 4.4 minutes, respectively. Rapid aging method with liquid ethanol was the fastest and simplest method for decreasing viability of rice seed.

034 HANAFI, H.

Empowerment strategy and efforts of agricultural group as seed nurseries of rice and second crop in supporting Jogya seed centre [Indonesia]. *Strategi dan upaya pemberdayaan kelompok tani sebagai penangkar benih padi dan palawija dalam*

mendukung pusat perbenihan Yogyakarta (Jogya seed centre) / Hanafi, H.; Setyono, B. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 472-481, 6 tables; 6 ref. 633.31/.4/SEM/a

ORYZA SATIVA; FOOD CROPS; SEED PRODUCTION; FARMERS ASSOCIATIONS; AGRICULTURAL EXTENSION.

Seeds now become strategic commodity. However, due to limitation of information and knowledge, many farmers in villages using indigenous seed produced by themself. As a result its yield did not increase. They depend on their own seed. Supply of superior varieties as agricultural technology component is very important in the efforts to increase the productivity of rice and second crop plants. However, their seed availability to fulfill the six appropriate conditions (variety, quantity, quality, time, place and price) has not satisfied yet. Acceleration for development of seed industry by creating sustainable new superior variety is urgently required to support the revitalization of agriculture, fishing and forestry (RPPK) since the agricultural production system demanded to have high competitiveness. The government's efforts to meet seed demand, especially rice and second crop have been done through the empowerment of farmer group as seed breeder. This is in line with the effort to increase of value added in agricultural production and farmers' income. The improvement of productivity and quality of agricultural product is more important to be done, and it has to be started with the use of qualified seed. Every regional government in district level in Yogyakarta have commitment and system to handling the seed nurturing in the efforts to supporting Yogya as seed centre. The objective of this research is to gather the information on government strategy and effort in addressing the seed problems, especially rice and second crop in Yogyakarta.

035 PALUPI, T.

Effect of coating formulation on viability, vigor and storability of rice seeds (*Oryza sativa* L.). *Pengaruh formula coating terhadap viabilitas dan vigor daya simpan benih padi (Oryza sativa L.)* / Palupi, T.; Palupi, S.; Machmud, M.; Widajati, E. (Universitas Tanjungpura Pontianak (Indonesia). Fakultas Pertanian). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 21-28, 1 ill., 5 tables; 16 ref.

ORYZA SATIVA; SEEDS; VIABILITY; SEED CHARACTERISTICS; VIGOUR; PROTECTIVE COATINGS; KEEPING QUALITY; SEED PELLETING; QUALITY.

The objectives of this research were to find the most compatible coating formula for rice seeds (Experiment 1), and to evaluate the effect of coating formula on viability, vigor and storability of the seeds (Experiment 2). This research was conducted in Laboratory of Seed Science and Technology at IPB, Bogor and Laboratory of Seed Technology at PT East West Seed Indonesia, Purwakarta from December 2010 to February 2011. In Experiment 1, ten coating materials (formula) were arranged in single factor of completely randomized design with four replications, i.e. uncoated seed, 3% alginate + 1% talc, 3% alginate + 1% gypsum, 3% alginate + 1% peat, 3% arabic gum + 1% talc, 3% arabic gum + 1% gypsum, 3% arabic gum + 1% peat, 1.5% CMC + 1% talc, 1.5% CMC + 1% gypsum, and 1.5% CMC + 1% peat. Experiment 2 used split plot design with four replications. The main plot was storage periods: 0.1 and 2 months. The seeds were stored in two storage conditions: ambient and air conditioned room. The subplot was coating formula (same as in Experiment 1). The results

of Experiment 1 showed that the most compatible coating material for rice seeds were 1.5% CMC + 1% talc, and 1.5% CMC + 1% gypsum, these formula were able to maintain vigor of the coated seeds. In Experiment 2, coating formula of 1.5% CMC + 1% peat generated higher seed vigor than uncoated seeds after two months storage, 3% arabic gum + 1% gypsum was able to keep vigor for one month storage in ambient condition. The coating formula of 3% alginate + 1% peat was able to keep viability and vigor of the coated seeds for two months in air conditioned room.

036 PANCANINGTYAS, S.

Resterilization in cocoa (*Theobroma cacao* L.) somatic embryogenesis propagation to save contaminated embryos. *Sterilisasi ulang pada perbanyakan somatic embriogenesis kakao (Theobroma cacao L.) untuk penyelamatan embrio terkontaminasi* / Pancaningtyas, S.; Ismayadi, C. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(1) p. 1-10, 5 tables; 19 ref.

THEOBROMA CACAO; SOMATIC EMBRYOGENESIS; CONTAMINATION; TISSUE CULTURE.

Somatic embryogenesis is a technique to produce primary embryos using tissue culture. Contamination in tissue culture can be caused by internal and external contaminant. Resterilization can be performed to save contaminated embryos. The aim of this research was to obtaine resterilization method in cocoa micropropagation by tissue culture so that free bacterial and embryogenic explants could be obtained. The experiments used five clones of cocoa, namely Sulawesi 1, KW 514, ICCRI 05, ICCRI 03 and ICCRI 04. Embryogenic clusters in multiplication medium were used as explant. Sodium hypochloride was used as sterilant. Several factors were evaluated using randomized block completely design, i.e. contaminant level, concentration of sterilant and period of sterilant application. Results of resterilization methods showed no significant effect among several factors tested. Among those factors, low contamination level, 10% concentration of sterilant and soaking showed the highest percentage of saving of contamined embryos. There was different response among five cocoa clones in producing embryogenic explants when using combination of resterilization methods.

037 SANTOSO, T.I.

Viability of post acclimatized plantlets of robusta coffee (*Coffea canephora*) after storage. *Viabilitas planlet pascaaklimatisasi kopi robusta (Coffea canephora) setelah penyimpanan* / Santoso, T.I.; Rahardjo, P. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 88-97, 5 ill., 1 table; 15 ref.

COFFEA CANEPHORA; ROBUSTA COFFEE; SEEDS; SEEDLINGS; STORAGE CONTAINERS; DENSITY; VIABILITY.

This research related to the storage method of planting materials in the form of post acclimatized plantlets of robusta coffee multiplied by somatic embryogenesis using plastic film that wrapped the whole of plantlets. This information is important to support the delivery of clonal planting materials to distribution points, especially robusta coffee plantlets viability based on condition of the container, storage period and density of plantlets. The research was conducted at Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute, located at 45 m asl., D rainfall type (Schmidt-Ferguson classification).

The first experiment determined the effect of container condition and storage duration on viability of robusta coffee plantlets. Each experimental unit was using 100 plantlets and each treatment was repeated three times with completely randomized design in factorial. The first factor was storage period levels: 0, 5, 10, 15 and 20 days. The storage container was cardboard volume 7 dm^3 and 11 dm^3. The second experiment was conducted for the optimization of storage volume and storage period. The results indicated that the maximum storage period was obtained in an airtight storage treatmeat with 10 days, 96.3% plantlets viability, 1% fallen leaves, 3.3% water loss and not significant difference to the control. For packing 100 plantlets with height 8-10 cm and leaf number 4-6 could use the volume of storage container up to 7 dm^3, which showed no significant difference to container volume 11 dm^3 in the percentage of viability, the percentage of fallen leaves, and loss of water.

F04 FERTILIZING

038 ANWAR, K.

[Fertilizing and amelioration package to increase soybean productivity on swamp soils C type in Project of One Million Swampland Areas]. ***Paket pemupukan dan ameliorasi untuk meningkatkan produktivitas kedelai pada tanah bergambut tipe luapan C di kawasan PLG sejuta hektar*** / Anwar, K.; Susilawati, A. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 208-212, 2 tables; 6 ref. 633.31/.4/SEM/a

GLYCINE MAX; FERTILIZER APPLICATION; DOLOMITE; NITROGEN FERTILIZERS; SOIL CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELDS; SWAMPS; SOILS.

Soybean development in swamp soil faces some constraints, one of them is an application of amelioration technology and fertilizing. The purposes of the study were to evaluate the amelioration and fertilizing packages to increase soybean production in acidic peat moss soil of a million hectare of "PLG" areal, in Kapuas District, Central Kalimantan. The nitrogen treatment were 1) Farmer's package: 0.5 t/ha of dolomite + 22.5 kg N/ha; 2) Agriculture Extension Services; 1.0 t/ha of dolomite + 22.5 kg N/ha + 36 kg of P_2O_5/ha; 3) Experiment's package: 2.0 t/ha of dolomite + 22.5 kg N + 67.5 kg of P_2O_5. The variety used was Anjasmoro, having 16 g/ha of seeds weight and yield potential of 3.7 t/ha. The result of the study showed that experiment's package was the best treatment. It was 105% increase of yield compared to farmer's package, and 33% increase of yield compared to Agriculture Extension Services.

039 BAON, J.B.

Soil chemical properties as affected by derived plant ash to the replacement of potassium fertilizer and its conversion value. ***Sifat kimia tanah akibat abu asal tanaman pengganti pupuk kalium dan nilai konversinya*** / Baon, J.B.; Sugiyanto (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 98-108, 7 ill., 24 ref.

SOIL FERTILITY; SOIL AMENDMENTS; POTASH FERTILIZERS; FERTILIZER APPLICATION; SOIL CHEMICOPHYSICAL PROPERTIES.

Potassium chloride (KCl) presently used as main source of K, tends to become more expensive, therefore, there is a need for a breakthrough in finding alternative materials to replace KCl. The aim of this paper is to present recent research on the use of plant derived ash to replace KCl fertilizer, especially in relation with soil chemical characteristics and its conversion value. Plant derived plant ash used in this experiment coming from palm sugar processing unit using farm wastes as main fuel. Treatments investigated were no K_2O application (control), applied with K_2O in forms of both KCl and plant derived ash in dosages of 100, 200, 300, 400, 500 and 600 mg/kg air dry soil. The mixture of soil with those treatments were then incubated for one year. After incubated period, the soil in pots were divided into two parts, first part was added with 2 g urea, while other part was added with 2 g SP-36. Both parts were incubated for two months. Results of this experiment showed that plant derived ash could be used to replace KCl. To obtain similar soil K content, the amount of K_2O in form of plant derived ash should be added or its conversion value was 1.44 times the amount of K_2O in form of KCl. Use of plant derived ash also increased the content of soil Ca, available P, ratio of Ca/Mg and pH. Plant derived ash did not cause nitrogen loss.

040 CHAILANI S., S.R.

Influence of potassium (KCl) fertilizers to SMV (soybean mosaic virus) on two soybean varieties. ***Pengaruh pemberian pupuk kalium terhadap infeksi SMV (soybean mosaic virus) pada dua varietas kedelai*** / Chailani S., S.R.; Gultom, N.N.; Hadiastono, T. (Universitas Brawijaya Malang (Indonesia). Fakultas Pertanian). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 289-298, 12 tables; 9 ref. 633.31/.4/SEM/a

GLYCINE MAX; SOYBEAN MOSAIC POTYVIRUS; DISEASE CONTROL; POTASH FERTILIZERS; DOSAGE; GROWTH; YIELD COMPONENTS; YIELDS.

Purpose of this research was to study the effect of potassium (KCl) fertilizers dosage to intensity of soyben mosaic virus (SMV) and to study growth and production of two soybean varieties (Wilis and Cikuray). This research was conducted at Phytopathology Laboratory, Faculty of Agriculture, Brawijaya University and Screen house at Tribhuwana Tunggadewi University from February to May 2009. This experiment used completely randomized design factorial (3x2) with four repeated. The first factor was differences of soybean varieties, and the second factor was differences in potassium dosage, K1=0 kg/ha (without fertilizer) as K2=50 kg/ha and as K3=75 kg/ha. Data were analyzed by Fisher test (Ftest) and BNT test with 5% trust. The result showed that the addition of potassium 50 kg/ha and 75 kg/ha decreased the intensity of SMV until 63.8% and 87.97% on two soybean varieties, respectively. The growth and resistance of Wilis variety was higher than Cikuray variety. The highest average plant height of 71.83 cm was achieved by Wilis variety and the lowest average (55.86 cm) was achieved by Cikuray variety. The highest average total leaves of Wilis variety was 42.68 blades and the lowest of average total leaves on Cikuray variety was 35.61 blades. The highest average wet weight and dry weight of Wilis variety was 24.68 g and 6.41 g, respectively. The lowest of average on Cikuray variety was 8.77 g and 3.2 g. The result revealed that growth and production of two soybean varieties were influenced by potassium application.

041 DJAZULI, M.

Effect of type and dosage of organic fertilizer on production and quality of pruatjan. ***Pengaruh jenis dan taraf pupuk organik terhadap produksi dan mutu purwoceng*** / Djazuli, M.; Pitono, J. (Balai Penelitian Tanaman Obat dan Aromatik, Pakuwon, Sukabumi (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 40-45, 4 tables; 15 ref. Appendices.

PIMPINELLA; ORGANIC FERTILIZERS; APPLICATION RATES; GROWTH; YIELDS; SITOSTEROL; STIGMASTEROL; STEROIDS.

In order to fulfill the demands of pruatjan raw materials for jamu industry, and to minimize negative impact of over exploration of natural pruatjan plants in the forest surrounding Mount Dieng areas, it is important to search new plantation areas for the development of such plant. This research aimed at finding out optimal combination of type and dosage of organic fertilizer for increasing production and quality of pruatjan raw material. A field experiment was conducted at Gunung Putri Experimental Station, Cianjur. The experiment was arranged using randomized block design with four replicates, and the treatment consisted of twelve combinations of type and dosage of organic fertilizer. The results showed that type of organic fertilizer significantly affected plant growth and biomass production. Application of chicken dung produced leaf, root, and total fresh and dry weights higher than those of sheep and cow dung, and compost. The highest fertilization efficiency was found on the application of chicken dung at low dosage with 0.24 kg/plant (or equivalent with 20 t/ha), however, it was not significantly different with that of higher level of fertilizer application. Sitosterol content was slightly higher in leaves than in roots. On the contrary, stigmasterol and total steroid in pruatjan roots were higher than those in leaves. Application of chicken and cow dung produced higher sitosterol content than those of sheep dung and compost. However, application of compost and sheep dung produced higher stigmasterol content than those of chicken and cow dung. Agroclimatic condition of Gunung Putri highland, Cianjur is well suited for the development of new pruatjan plantation area.

042 ISMON, L.

Application of rice straw with potassium fertilizer on rice crop at newly opened Dystropepts soil. ***Aplikasi jerami padi dengan pupuk kalium pada pertanaman padi sawah di tanah Dystropepts bukaan baru*** / Ismon, L.; Yufdy, M.P. (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(3) p. 217-230, 6 tables; 28 ref. Appendix.

IRRIGATED RICE; RICE STRAW; POTASH FERTILIZERS; FERTILIZER APPLICATION; DOSAGE; SOIL CHEMICOPHYSICAL PROPERTIES; AGRONOMIC CHARACTERS; YIELD COMPONENTS.

Low rice production at newly lowland rice is caused by low soil fertility and high soil iron content. So that, suitable application of fertilizer and ameliorant is needed for improving and increasing productivity of newly opened of paddy areas. This research using Lado-21 technology, was aimed at 1) studying the combination effect of K fertilizer and rice straw, and their efficiency as well as economic value; 2) studying the straw doses that can substitute K fertilizer. The experiment was conducted in the farmer field at Sitiung II Block A Pulau Mainan Village, Koto Baru Subdistrict, Dharmasraya Regency, West Sumatra. The experiment was arranged in randomized completely block design with three replications. The treatments consisted of seven combination of straw with different level of K fertilizer based on soil analysis (HCL extracted 25%) i.e.: A) based on soil analysis without straw

application; B) three of quarter part of K dose of that soil analysis basis with 2.5 ton straw; C) a half of K dose of that soil analysis basis with 5 t straw; D) Y a quarter part of K dose of that soil analysis basis with 7.5 ton straw; E) Without K but with 10 ton straw; F) three of quarter part of K dose of that soil analysis basis with 1 t compose of straw; and G) three of quarter part of K dose of that soil analysis basis with 1 ton manure/ha, and H) farmers practices as control. The results showed that application of 2.5 ton rice straw/ha could decrease doses of KCl from 100 kg/ha to 75 kg/ha and effectively increased yield production. Application of 10 ton rice straw could substitute all of K fertilizer application and resulted in no significantly different with that of application of 100 kg KCl/ha, and effectively decreased soil iron toxicity. Combined application of rice straw and K with Lado-21 technology increased R/C value from 1.1 to 2.2 until 2.8 and B/C value from 12 to 18 time higher than that farmer practise. Application of package B (75 kg KCl + 2.5 ton rice straw/ha) with Lado-21 technology gave the highest income at Rp 8,089,750/ha/season.

043 JAMAL, H.

Farmer's response on trichocompost technology with based material of rice straw in Jambi Province [Indonesia]. ***Respon petani terhadap teknologi trichokompos berbahan dasar jerami padi di Provinsi Jambi*** / Jamal, H. (Badan Penelitian dan Pengembangan Daerah Provinsi Jambi (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(3) p. 171-180, 4 tables; 18 ref.

RICE STRAW; ORGANIC FERTILIZERS; COMPOSTS; COMPOSTING; TRICHODERMA; TECHNOLOGY TRANSFER; FARMERS; SUMATRA.

The utilization of rice straw as organic fertilizer with bioactivator *Trichoderma* sp., well known as Trichocompost, has been introduced to farmers in Jambi Province since the year of 2004. However, till the end of 2009, only 3% of the farmers practiced the technology. Therefore, a research was conducted to identify problems facing the farmers in practicing the technology. The data was collected on June 2010 through a survey on five regencies which had been introduced by the technology in Jambi Province: Kerinci, Bungo, Sarolangun, Merangin and Tanjung Jabung Barat. The respondents of the survey consisted of 75 farmers who practiced Trichocompost technology and 61 farmers who had not yet practiced or no longer practiced the technology. The result of the research showed that the most difficult technology component practiced by the farmers was "to chop rice straw". While, the most important difficulty facing the farmers who did not practice the technology was "not enough time and labour" and "lack of socialization on trichocompost technology". To ensure a long-term application of Trichocompost technology it needs to introduce a more simple method in composting process which is without rice straw chopping, along with integrated and effective socialization activities.

044 KUNTYASTUTI, H.

Effect of fertilizers and straw treatment on soybean at Vertisols Ngawi [Indonesia]. ***Pengaruh pemupukan dan pengelolaan jerami terhadap kedelai di tanah Vertisols Ngawi*** / Kuntyastuti, H.; Purwaningrahayu, R.D.; Wijanarko, A.; Taufiq, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 174-187, 9 tables; 27 ref. 633.31/.4/SEM/a

GLYCINE MAX; FERTILIZER APPLICATION; NPK FERTILIZERS; DOSAGE; STRAW MULCHES; SOIL CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELD COMPONENTS; YIELDS.

Fertilizing is not always increase seed yield of soybean in Vertisols Ngawi. The use of mulch can improve nodulation and nitrogen fixation activity, improvement of soil fertility, reduce evaporation, lowering the maximum temperature of soil, increasing soil moisture, suppress weed growth, and can increase seed yield of soybean. Related to this, a study has been done to evaluate the effect of fertilizer and straw management on growth and yield of soybean in the cropping pattern of rice-soybean and soybean-soybean in paddy field Vertisols Ngawi. The research used a split plot design with three replications. The main plot was a three-way utilization of rice straw; subplot was five combinations of NPK fertilizers. The results showed that the wetland Vertisols Ngawi, ZA fertilizer of 50 kg, 50 kg SP-36, 100 kg KCl/ha were technically feasible to be applied on soybean cultivation in the former land of rice or soybeans used beds of 2 m without rice straw, with straw mulch or straw burned. Economic viability and social culture should be assessed in Integrated Crop Management program. Utilization of rice straw could increased soybean seed yield in the former soybean land.

045 MANSHURI, A.G.

N, P and K fertilizer application for soybean based on plant requirement and soil fertility. ***Pemupukan N, P dan K pada kedelai sesuai kebutuhan tanaman dan daya dukung lahan*** / Manshuri, A.G. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 171-179, 3 ill., 11 tables; 23 ref.

GLYCINE MAX; NPK FERTILIZERS; DOSAGE; FERTILIZER APPLICATION; PLANT REQUIREMENTS; NUTRITIONAL REQUIREMENTS; NUTRIENT UPTAKE; SOIL FERTILITY; YIELDS.

In a soil with the nutrient status of N, P, and K varied greatly, the suggested rate of N, P, and K fertilizers is generally inefficient, and is considered to accelerate the degradation of soil fertility, due to the excessive rate of fertilizer. This study was aimed at developing guidelines for N, P, and K fertilizers application standard, according to the soybean crop needs and the nutrient land capacity for soybean crops in the paddy field. Research was conducted in 2007 and 2008 at 21 locations, i.e., 9 locations in Blitar, two locations in Ponorogo, and 10 locations in Madiun, using the omission plot technique. Validation study was conducted in 2009 at 12 locations, i.e., four locations in Blitar for a 3.0 t/ha yield target, four locations in Ponorogo for a 2.5 t/ha yield target, and four locations in Madiun for the 2.0/ha yield target. The results showed that the nutrient ability of lands to provide nutrients N, P, and K varied, ranging from 58-184 kg N/ha, 5-23 kg P/ha, and 8-119 kg K/ha. The N Recovery Efficiency (NRE) ranged from 0.3 - 0.9 kg/kg; the P Recovery Efficiency (PRE) from 0 - 0.3 kg/kg, and the K Recovery Efficiency (KRE) 0.1 - 0.8 kg/kg. Optimum N uptake followed a linear equation YN-Opt = 14.201X; optimum P uptake followed a linear equation of YP-Opt = 133.47X, while the optimal K uptake followed the linear equation of YK-Opt = 23.473X. Guidelines for N, P, and K application for soybean crop in the paddy field according to the crop needs, the nutrient land supporting capacity, and the yield target had been produced. Validation of the model result in yield targeted of 2.0 t/ha in Madiun, the 2.5 t/ha yield in Ponorogo and to the 3.0 t/ha yield in Blitar, each in 50% of the locations. Yield target of 2 t/ha or more was obtained from 50% of the locations in Madiun District; yield targeted of 2.5 t/ha was obtained from 75% of the locations in Ponorogo District, while yield target of 3.0 t/ha was obtained from 58.3% of the locations in Blitar District.

046 WASITO

Farmer's perception and adoption of balanced fertilizer on a 300 rice planting index. *Persepsi dan adopsi petani terhadap teknologi pemupukan berimbang pada tanaman padi dengan indeks pertanaman 300* / Wasito; Sarwani, M. (Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia)); Ananto, E.E. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 157-165, 10 ill., 4 tables; 36 ref.

ORYZA SATIVA; ORGANIC FERTILIZERS; INORGANIC FERTILIZERS; FERTILIZER APPLICATION; TECHNOLOGY TRANSFER; CROPPING PATTERNS; YIELDS.

Balanced fertilization means that fertilizer is applied at right dosage, type, and time. The type of adoption of fertilizer used may either inorganic fertilizer or organic material. The assessment of balanced fertilization was conducted in the Village of Gondel, Panolan, Klagen (Kedungtuban Subdistrict), in Ngloram Village, Jipang, Getas (Cepu Subdistrict), all in Blora District of Central Java. The objective was to determine whether the adoption of inorganic fertilizer and organic matter in the 300 Rice Planting Index was in line with the farmer's perception of balanced fertilization application. The study was conducted by observation and discussion with farmers in farm communities in a form of focus group discussions, and indepth participatory interviews involving 48 farmers on a basis of purposive sampling. The results showed that adoption of the use of urea, SP-36 and Ponska fertilizers in the Village Gondel, Panolan, and Ngloram varied greatly at level of significantly different, while that in Klagen, Jipang, Getas Villages was significantly different from that of the regional recommendation rates. Adoption rate of urea, SP-36, Ponska, and organic materials was in line with the perception of farmers, but it was not in accordance with the principles of balanced fertilization. Number of farmers with the perception level of "not yet understand" the balanced fertilization concept was much higher than those of fully understood the concept, parallel with the smallness number of farmers who bad adopted balanced fertilization. Therefore, demonstration plots on balanced fertilization are suggested in the study area.

F06 IRRIGATION

047 BAHRUN, A.

Effect of partial root zone irrigation on water use efficiency and yield of field-grown soybean (*Glycine max* L.) during dry season. *Pengaruh pengairan separuh daerah akar terhadap efisiensi penggunaan air dan produksi kedelai (Glycine max L.) pada musim kemarau* / Bahrun, A.; Hasid, R.; Muhidin; Erawan, D. (Universitas Haluoleo, Kendari (Indonesia)). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 36-41, 5 ill., 1 table; 19 ref.

GLYCINE MAX; IRRIGATION; ABA; RHIZOSPHERE; WATER USE; EFFICIENCY; DRY SEASON; YIELDS.

A new method of irrigation was designed for increasing water use efficiency (WUE) and yield of soybean grown during dry season. This experiment consisted of four treatments, namely (1) the whole root zone system was irrigated with 4 l/ m^2; (2) the partial root zone system was irrigated with 4 l/m^2; (3) the partial root zone system was irrigated with 3 l/m^2; and (4) the partial root zone system was irrigated with 2 l/m^2. Partial root zone irrigation treatments were done by daily watering one side between two plants row while the other side was allowed to dry and irrigation was shifted to the dry side while the wet side was allowed

to dry every 7 days irrigation interval, respectively. The experiment was designed as a randomized completely block design with four replications and a 2.6 m x 2.4 m plot size. The results showed that the partial root zone irrigation treatment maintained growth, biomass, nodule, relative leaf water content, relative leaf chlorophyll content, leaf nitrogen content and yield at the level of fully irrigated treatment and increased leaf AEA content and water use efficiency, but the effect depended on volume of water applied. Partial root zone irrigation with 2 l/m^2 and 3 l/m^2 irrigation decreased yield by 2.97% and 16.91%, respectively, however, those treatments increased water use efficiency by 29.97% and 23.63%, respectively, compared to those with fully irrigated plots.

048 MUNARSO, Y.P.

Rice hybrids yield performance on intermittent and submerged irrigation. ***Keragaan padi hibrida pada sistem pengairan intermittent dan tergenang*** / Munarso, Y.P. (Balai Besar Penelitian Tanaman Padi, Sukamandi, Subang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 189-195, 9 tables; 14 ref.

ORYZA SATIVA; HYBRIDS; IRRIGATION SYSTEMS; FOOD IRRIGATION; DEMAND IRRIGATION; FLOODING; GROWTH; YIELD COMPONENTS; YIELDS.

An experiment to evaluate growth and yield performance of rice hybrids planted in different irrigation system was conducted at the green house of the Indonesian Center for Rice Research in Sukamandi, Subang 2010. The experiment was arranged in a randomized block design with irrigation system (intermittent and continuous flooded) as first factor and genotype of hybrid (15 genotypes) as second factor, with 2 replications. Results showed that genotype was dominant determinant factor for several observed variables, i.e. plant height, total tillers, flowering and harvesting time, and root character (root volume) as well. Genotype acts as single determinant factor on paddy grain yield, and its yield components (total and percentage of filled grain). Yield observation showed that, this variable was significantly affected by hybrid genotype. Genotype G23 showed to be the highest yielding genotype. Rice grain yield was supported by yield components of total filled-grains and percentage of seed set, rather than panicle length. Intermittent treatment produced longer root. Meanwhile, continuous submerged produced shorter root with more branch.

049 SUPIJATNO

Water consumption evaluation among rice genotypes showing possibility to explore benefit of water use efficiency. ***Evaluasi konsumsi air beberapa genotipe padi untuk potensi efisiensi penggunaan air*** / Supijatno; Chozin, M.A.; Sopandie, D.; Trikoesoemaningtyas; Junaedi, A.; Lubis, I. (Institut Pertanian Bogor (Indonesia). Fakultas Pertanian). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 15-20, 1 ill., 5 tables; 17 ref.

ORYZA SATIVA; GENOTYPES; WATERING; GROWTH; WATER USE; EFFICIENCY; YIELD COMPONENTS; YIELDS.

Water use efficient varieties in rice may have good opportunity in term of economic value and scarcity of water. This study was conducted to determine water consumption among rice genotypes that conventionally cultivated as lowland (IR-64, IPB97-F-15, Ciherang, Mentik Wangi, and Rokan hybrid), upland (Jatiluhur, Silugonggo), and amphibian type (Way Apo Buru) that could be planted both as lowland and upland. Rice seedlings at 14 days old were transplanted in a plastic container containing 83 kg of air dried soil, 1 plant per whole and 6

plants per container. The experiment was conducted in a vinyl house, using randomized completely block design with three replications. During rice growth, water table was maintained at 2 cm above soil surface, and water was added and recorded weekly. The results showed that production components and yield of several rice genotypes were significantly different. Water consumptions among varieties were significantly different, ranged from 15.93 l/plant for IR-64 to 24.13 l/plant for Jatiluhur, or equal with 3,639 to 4,827 m^3/ha. Jatiluhur was the most efficient variety in using water. This finding could be use as guide to explore benefit of water use efficient variety as sustainable option in water management of rice cultivation.

050 YAMIN, M.

Early maturing rice genotypes tolerant to limited water supplies. ***Toleransi beberapa genotipe padi umur pendek terhadap pasokan air terbatas*** / Yamin, M.; Suprihatno, B.; Rustiati, T.; Sitaresmi, T. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 71-78, 6 tables; 12 ref.

ORYZA SATIVA; GENOTYPES; WATER SUPPLY; IRRIGATION; DROUGHT RESISTANCE; FLOWERING; YIELDS.

Field and screen house experiments were conducted in 2009 in Indramayu and Sukamandi. The field experiments was carried out at farmer's field in the Cilandak Village, Anjatan District, Indramayu Regency from May to October 2009. Seven rice genotypes (AS996, OM5240, BP5478-2F-KN-11-2-B, Inpari 10, Inpari 1, Silugonggo, and Dodokan) were tested. The experiment was arranged in a randomized block design with three replications. The treatments were: (a) fully irrigated (100% irrigated); (b) half-dry (75% irrigated), irrigation water was given until one month after planting, followed with weekly irrigation until crop harvest, and (c) dry (50% irrigated), irrigation water was given until one month after planting, then no more irrigation was given until harvest. The plant characters observed were percentage of empty grain per panicle, grain weight per unit area, drought sensitivity index (S), and genotype superiority index (Pi). The screenhouse experiment was conducted in pots at the Indonesian Center for Rice Research, Sukamandi, from July to October 2009, arranged in a completely randomized block design with three replications. The rice genotypes tested were the same as those in the field trial. The treatments were three categories of water supply, namely minimum (4,000 m^3 /ha/season), optimal (5,500 m^3/ha/season) and excessive (7,000 m^3/ha/season). The plant characters observed were grain weight (g/pot), percentage of filled grains/panicle, plant height, and age of flowering. The results showed that water stress during flowering stage increased percentage of empty grains 25.6 - 34.3% and decreased grain yields 11.3 - 23.2%. Genotypes AS996, OM5240, and BP5478-2F-KN-11-2-B were tolerant to drought, and gave higher yields than Inpari 10, Inpari 1, Silugonggo, and Dodokan. Under drought stress conditions, when the drought conditions were not extreme with soil moistures of 41.3 - 51.7%, yields of the three genotypes were not significantly tolerances from those under the normal condition (6.66 to 7.27 t/ha). Besides drought tolerance, genotypes AS996 and OM5240 were also efficient in using water during the crop growth.

F07 SOIL CULTIVATION

051 LAMID, Z.

Integration of weed control and no soil tillage in lowland rice cultivation towards the climate change. ***Integrasi pengendalian gulma dan teknologi tanpa olah tanah pada***

usaha tani padi sawah menghadapi perubahan iklim / Lamid, Z. (Balai Pengkajian Teknologi Pertanian Jakarta (Indonesia)). *Pengembangan Inovasi Pertanian* (Indonesia). ISSN 1979-5378 (2011) v. 4(1) p. 14-28.

WETLAND RICE; ZERO TILLAGE; WEEDS; WEED CONTROL; VEGETATIVE PROPAGATION; LAND POPULATION; CLIMATOLOGY.

Land preparation is one of weed control methods. In pre-green revolution era, simple land preparation was practiced then weeds were cut and burn. In the green revolution era, this method was left behind and swifts to intensive land preparation, a recommended method in lowland rice intensification program. However, this method caused the decrease in lowland soil productivity (soil sickess), inducing the coming out of innovative no-tilled (NT) technology. Research and assessment results showed that NT had several advantages, namely: (1) efficient in resource and budget uses (need less water, control weeds, conserve labors), (2) mitigate and adaptive to climate changes (reducing methane emissions, less defective roots during dry season and short planting time interval that increase planting indexes from 300 to 400), and (3) increased soil and rice productivity (root growth was concentrated within oxidation zone, contributing C-organic to soil from decomposed plant materials, efficient in N, P, and K absorption which perform better plant growth that contributed to higher rice grain yield). However, NT did not develop at farmer level due to their usual practicing intensive tillage, narrow land farm, untouchable innovative technology and intensively mechanization introduction for land preparation. Therefore, socialization, dissemination and promotion, and considering that NT as alternative technology in increasing national rice production program through integrated crop management should be implemented for the future.

F08 CROPPING PATTERNS AND SYSTEMS

052 HARSONO, A.
Cassava productivity on an intercropping with soybean and groundnut in dry acid soil. ***Analisis produktivitas tumpangsari ubi kayu dengan kedelai dan kacang tanah di lahan kering masam*** / Harsono, A.; Sudaryono; Radjit, B.S. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 186-192, 5 tables; 20 ref.

GLYCINE MAX; MANIHOT ESCULENTA; ARACHIS HYPOGAEA; INTERCROPPING; SOIL CHEMICOPHYSICAL PROPERTIES; SPACING; PLANTING DATE; FERTILIZER APPLICATION; YIELDS; FARM INCOME; COST BENEFIT ANALYSIS; DRY FARMING; ACID SOILS.

The Ultisol acid soils in Lampung are usually planted with cassava as a monoculture. On the present research, cassava was intercropped with soybean and groundnut. The research was carried out during the wet season of 2007, following a cropping pattern of cassava + soybean /+ groundnut, in Rumbia Subdistrict of Central Lampung. The experiment was arranged in a split plot design with three replications. The main plot was: (A) cassava 100% (125 cm x 60 cm plant spacing) + soybean (planted two weeks before the cassava); (B) cassava 100% (plants spacing of 125 cm x 60 cm) + soybean (planted at the same time with cassava); (C) cassava with double rows [(80 cm x 60 cm) x 250 cm] + soybean (planted two weeks before the cassava), and (0) cassava with double rows [(80 cm x 60 cm) x 250 cm] + soybean (planted at the same time with cassava). The subplot was the rates of fertilizer application on groundnut planted after soybean, i.e., (1) 75 kg urea + 100 kg SP-36 + 100 kg KCl/ha; (2) 37,S kg urea + 50 kg SP-36 + 50 kg KCl/ha, and (3) no NPK fertilizer application. As

control, at the sametime, cassava, soybean, and groundnut was each grown in monoculture. Plot size was 8 m x 5 m. The cassava, soybean, and groundnut variety was each UJ-5, Tanggamus, and Kancil, respectively. The rate of fertilizer applied to soybean was 75 kg urea + 100 kg SP-36 + 100 kg KCl + 1,000 kg cattle manure + 500 kg dolomite/ha, broadcast during the planting time. Fertilizer applied on cassava at planting time was 100 kg urea + 100 kg SP-36 + 100 kg KCl + 1,000 kg cattle manure + 500 kg dolomite/ha, and at 4 month-old plants was 100 kg/ha urea. Weeds, pests, and diseases controls were done intensively. The results indicated that the level of cassava productivity in monoculture could be increased to a Land Equipment Ratios (LER) of 2.81-2.95, when it was grown in an intercropped with soybean and groundnut, in a form of cassava + soybean /+ groundnut planting pattern. This cropping pattern increased farmers profit from Rp 13,580,000/ha to Rp 23,493,7000-24,601.800/ha or by 73-81%, compared to that of cassava monoculture. To obtain a higher soybean yield, higher rates of Nand P fertilizers was needed. Residues of cattle manure and dolomite that was given to soybean was still sufficient for groundnut planted after soybean. To achieve 2.0 t/ha or more dry pods of groundnut yields, the crop needed to be fertilized with 75 kg urea + 100 kg SP-36 + 100 kg KCl/ha. Reduction of fertilizer application by 50% decreased the groundnut yield significantly.

F30 PLANT GENETICS AND BREEDING

053 ARIF, A.B.

Inheritance of several qualitative characters in three groups of pepper. ***Pewarisan sifat beberapa karakter kualitatif pada tiga kelompok cabai*** / Arif, A.B. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Sujiprihati, S.; Syukur, M. *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 73-79, 10 tables; 15 ref.

CAPSICUM ANNUUM; BACKCROSSING; GENETIC INHERITANCE; AGRONOMIC CHARACTERS; PHENOTYPES.

Selection method is one of most important factors in determining the success of pepper breeding programs. Selection method will be effective if it is supported by a complete knowledge of genetic character inheritance. This research was aimed at investigating the information of inheritance pattern of pepper adaptability to qualitative characters. There were two steps in this research, i.e makes genetic material and inheritance study of qualitative characters in the field. The result showed that all qualitative characters controlled one gen. Several qualitative characters were affected by full dominant action gene (young stem colour and fruit texture) and other character was affected by partial dominant action gene (young fruit colour and flower position).

054 ARIMARSETIOWATI, R.

Effect of auxin 2,4-D and cytokinin 2-ip on direct somatic embryogenesis formation of *Coffea arabica* L. leaf explant. ***Pengaruh auksin 2,4-D dan sitokinin 2-ip terhadap pembentukan embriogenesis somatik langsung pada eksplan daun Coffea arabica L.*** / Arimarsetiowati, R. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 68-76, 2 tables; 27 ref.

COFFEA ARABICA; PLANT PROPAGATION; SOMATIC EMBRYOGENESIS; TISSUE CULTURE; AUXINS; CYTOKININS; LEAVES.

One of propagation technique for coffee plant production is tissue culture. Tissue culture technique for *Coffea arabica* L. faces some problems, mainly in the plantlet formation regenerated from explants. The objective of this experiment was to examine the effect of 2,4-D and 2-ip combination on the formation of direct somatic embryogenesis of *Coffea arabica* L. in leaves explant. Auxin (2,4-D) and cytokinin (2-ip) concentrations, i.e. 1; 5 µM and 5; 10; 15; 20 µM, respectively were used as treatments. This research was conducted using completely randomized design with 10 replications. Observation on induced somatic embryos was done by quantitatively on number of callus from explant and number of embryogenic callus. In addition, observation by qualitative descriptive was also done on embryogenesis development. The results showed that Arabica coffee leaves explant of AS 2K clones could be induced in all medium combination except 5 µM 2,4-D and 20 µM 2-ip combination. Arabica coffee leaves explant of S 795, Sigarautang and AS 1 varieties could be induced in all medium combination. The highest frequency of callus formation was found in AS 2K, Sigarautang and AS 1 varieties on medium containing 1 µM 2,4-D in combination with 10 µM 2-ip, whereas for the S 795 variety on medium containing 5 µM 2,4-D in combination with 10 µM 2-ip. The highest frequency of embryogenic callus in all Arabica coffee varieties could be reached on medium containing 5 µM 2,4-D in combination with 15 µM 2-ip.

055 ASADI

Path analysis of agronomic characters and resistance to pod sucker bug on yield of soybean germplasm. ***Sidik lintas karakter agronomi dan ketahanan hama pengisap polong terhadap hasil plasma nutfah kedelai*** / Asadi (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2012) v. 18(1) p. 1-8, 2 ill., 5 tables; 15 ref.

GLYCINE MAX; GERMPLASM; STATISTICAL METHODS; AGRONOMIC CHARACTERS; FRUIT DAMAGING INSECTS; PEST RESISTANCE; GROWTH; YIELDS.

Soybean productivity is still low and unstable that commonly caused by pest attack and disease. Pod sucking insect pest is the most serious pest of soybean that reduce seed production. *Riptortus linearis* is the most dominant pest of pod sucking bug of soybean. Planting of resistant variety is one of the biological control. To support the soybean breeding program for pod sucking pest resistance, the availability of sources of resistant genes is needed. Sources of resistant genes are obtained by evaluating and identifying soybean germplasm. Based on soybean germplasm evaluation, it can be identified sources of resistant genes that can be used as the base material for soybean breeding programs for pod sucking pest resistance. The influence of independent variable (Xi) such as agronomic characters and resistance to pod sucking on seed yield as the dependent variable (Yi) of soybean germplasm, can be estimated by path analysis. By knowing the characters that influence the seed yield directly, the character can be used for selection of soybean yield. Based on 103 evaluations of soybean germplasm, 5 accessions (B3778, B4400, B3802, B4176, and B2973) were identified as the resistant accessions, while accessions B4142, B4417 (Panderman), and the B3462 were the most susceptible to pest of pod sucking bug. The seed size or pod size of soybean germplasm correlated positively and significantly with resistance to pod sucking bug. Multiple regression analysis indicated that the plant height (X3), and pod sucking bug attack (X7) significantly affected seed yield of soybean germplasm. The higher plant, the lower pod sucking bug attack, the higher soybean yield. Path analysis showed that plant high character (X3) affected the seed yield of soybean germplasm directly, indicating that the plant high character can be used for the selection of seed yield of soybean germplasm.

Number of pods per plant (X5) by the effect of plant height (X3) affected the grain yield (Y) of soybean germplasm indirectly.

056 HAPSARI, R.T.

[Soybean germplasm with very early maturity, big seed and high yield characteristics]. ***Karakteristik plasma nutfah kedelai umur sangat genjah, biji besar dan hasil tinggi*** / Hapsari, R.T.; Suyamto (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 102-109, 5 tables; 9 ref. 633.31/.4/SEM/a

GLYCINE MAX; GERMPLASM; IDENTIFICATION; PRECOCITY; MATURITY; GROWTH; YIELD COMPONENTS; YIELDS.

Very early maturity days, big size seed and high seed yield in soybean germplasm are important information which can be used for breeder in plant breeding. The experiment was conducted at Ngale Research Station, Ngawi, East Java on dry season 2009. Ninety nine accessions were planted in 10 m single row with plant spacing 1 m x 0.2 m. Plants were fertilized with 50 kg urea, 75 kg SP-36 and 50 kg KCl/ha. Parameters measured were plant height, flowering date, maturity days, number of nodes on main stem, number of pod per plant, number of seed per 100 plant, number of seed per pod, 100 seed weight and seed yield per plant. The result showed that there were no accessions which had very early maturity days, big size seed, and high seed yield all it once. Accessions MLGG 0645 had early maturity days (79 dap), big seed size (14.6 g) with seed yield per plant 18.9 g. Characteristic of soybean germplasm with very early maturity days were early flowering date, short plant height, whereas number of nodes per main stem, number of pods per plant, number of seeds per plant and seed yield per plant prone to less. MLGG 0749, MLGG 0752 and MLGG 0753 were included to very early maturity days. Accessions with big seeds size, had early maturity days, medium plant height, whereas number of nodes per main stem, and seed yield per plant were above the overall average of accessions, while the number of pods per nodes, number of pods per plant, number of seeds per pod, and number of seed yield per plants were under the overall average of accessions. An accession which included in to a big seeds size were MLGG 0737, MLGG 1002, MLGG 0756, MLGG 0591, MLGG 0738, MLGG 0613, MLGG 0984, MLGG 0715, MLGG 0712, MLGG 0582, MLGG 0595, MLGG 0645, and MLGG 0564. Accessions which had high yield per plant were early maturity days, medium plant height, medium seed size, whereas the number of nodes per main stem, number of pods per nodes, number of pods per plant, number of seeds per pod, and number of seeds per plant were above the overall average of accessions. Ten accessions had the highest yield per plant, namely MLGG 1041, MLGG 1016, MLGG 0984, MLGG 0598, MLGG 0563, MLGG 0743, MLGG 0645, MLGG 1036, MLGG 0612, and MLGG 0536.

057 HERLINA, L.

Field selection on several rice varieties for resistance to bacterial leaf blight strain IV and VIII. ***Seleksi lapang ketahanan beberapa varietas padi terhadap infeksi hawar daun bakteri strain IV dan VIII*** / Herlina, L.; Silitonga, T.S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 80-87, 9 tables; 16 ref.

ORYZA SATIVA; VARIETIES; GENE BANKS; XANTHOMONAS ORYZAE; BLIGHTS; SELECTION; DISEASE RESISTANCE.

Bacterial leaf blight (BLB) on rice (*Oryza sativa*) caused by *Xanthomonas oryzae pv. oryzae* (Xoo) is the major obstruction for rice production. Powerful strategy to control BLB is generally conducted by planting resistant plant. Meanwhile, the main way to explore germplasm as the source of resistance gene is conducted by selection of wide rice varieties. Field selection for resistance to BLB on 150 rice-varieties (ICABIOGRAD collection) was conducted in 2009 in Cianjur. Three leaves and flag leaves of individual hills at vegetative and flowering stage were inoculated by clipping the leaf tip with scissors which had been connected with a suspension bottle of bacterial cells (10^9 - 10^{10} cells/ml) of the isolates which represented bacterial groups (strain) IV and VIII, respectively. Each plant was inoculated with one race. Two weeks after inoculation, length of the lesion developed on the inoculated leaf was measured, as an index of severity of infection by BLB. This experiment was treated as factorial randomized completely block design (two factors with 3 replications, respectively). The resistancy reaction to strain IV and VIII was observed as the variable tested, while the factors measured consists of plant varieties and two bacterial strains. The results showed that 11 varieties with a resistance-reaction to Xoo strain IV, in which 5 varieties poses a consistent resistance-reaction, i.e: Pulu Bolong, Pelopor, Gombal, Barito and Kapuas. While resistance-reaction to Xoo strain VIII obtained only one variety: IR-42 (score-1), while 17 others showed intermediate resistancy (score-3).

058 KHADIJAH, N.

Evaluation of uniformity and stability for five yardlong bean varieties on DUS test. *Evaluasi keseragaman dan kestabilan lima varietas kacang panjang dalam uji BUSS* / Khadijah, N. (Pusat Perlindungan Varietas Tanaman dan Perizinan Pertanian, Jakarta (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2012) v. 18(1) p. 18-25, 1 ill., 2 tables; 12 ref.

VIGNA UNGUICULATA SESQUIPEDALIS; GENETIC STABILITY; STATISTICAL METHODS.

Uniformity and stability aspects in DUS test for self pollination crop such as yardlong bean is usually done by simple assessment methods. The aim of this research was at evaluating the assessment of both aspects using statistical tools. The object of the research was five yard long bean varieties applied for PVP rights. The candidates were Brawijaya 1, Brawijaya 3, Brawijaya 4, Bagong 2, and Bagong 3 which belong to Prof. Kuswanto of Brawijaya University. The test was carried out into two planting seasons (April-June 2011 and September-December 2011). Randomized block design was used as test design with a total population of 60 plants per variety, divided into three replicates and sample size were 21 plants or plant parts per variety. Six varieties of KPI, KP7, Putih Super, Hijau Super, Parade, and Pangeran were used as comparable varieties. The observations were recorded on 50 DUS characteristics as listed in the test guideline document of PPU BUSS yardlong bean (PPU/PVT/19/2). Statistical analyses used was cluster analysis; relative variance and homogeneity test used to evaluate the assessment of candidates on uniformity and stability aspects. Results showed that statistical analysis gave the same decision with the usual simple assessment, but with more accuracy.

059 KRISDIANA, R.

Dissemination of soybean superior variety in East Java and West Nusa Tenggara (Indonesia). *Penyebaran varietas unggul kedelai di Jawa Timur dan NTB* / Krisdiana, R.

(Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 376-389, 4 ill., 6 tables; 9 ref. 633.31/.4/SEM/a

GLYCINE MAX; HIGH YIELDING VARIETIES; ECONOMIC DISTRIBUTION; JAVA;

The objectives of this research were: (1) identifying dissemination and constructing map of soybean superior variety, (2) identifying farmers preference of soybean characteristics,and (3) reviewing farmer factors consideration in choosing soybean superior variety. This research was conducted in East Java consisting of ten regencies, Ngawi, Bojonegoro, Nganjuk, Lamongan, Blitar, Pasuruan, Sampang, Jember and Banyuwangi; and six regencies in West Nusa Tenggara, those are Lombok Barat, Lombok Tengah, Lombok Timur, Sumbawa, Dompu and Bima. This research was done by using survey method to soybean farmers. Thirty farmers were taken randomly as samples for each regency. Hence, there wre 300 samples in East Java and 180 samples inWest Nusa Tenggara. Totally 480 farmers were taken as samples for the research. The collected data comprised (1) general characteristics of farmer including experiences in soybean cultivation, age, education, total of family member, land width for cultivating soybean; (2) soybean variety used and reasons in choosing the variety; (3) seed derivation; (4) reason of difficulties to obtain the superior seed; (5) knowledge about superior variety, weaknesses, strengthen and expectation on superior variety; (6) farmers consideration factors in choosing soybean superior variety. To analyze the data, this reseach used descriptive analysis and principal component analysis. Result of the research showed that dissemination of soybean superior varieties in East Java based on the widest area are Wilis, Anjasmoro and Argomulyo varieties, respectively. While, dissemination of varieties based on the greatest user farmer in East Java are Anjasmoro, Wilis, and Argomulyo varieties, respectively. Meanwhile, dissemination of varieties based on the greatest user farmer in West Nusa Tenggara are Wilis, Anjasmoro, and Bromo varieties. The weaknesses of soybean superior variety were that it was difficult to obtain it and it was unsustainable to drought. Farmer preference characteristics of soybean variety was those with high yielding, yellow seed skin, brown legume, middle-high plant, many branches, semidetermined type, flowering at 40-45 days, harvest age at 80-90 days for West Nusa Tenggara. Dominant factor that should be considered by farmer in East Java in choosing soybean variety was their harvest age and seed size. While in West Nusa Tenggara was seed shape, seed size and branch type.

060 KRISNAWATI, A.

[Selection of early maturity and big-sized seed soybean lines]. ***Seleksi galur kedelai berumur genjah dan berukuran biji besar*** / Krisnawati, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Adie, M.M. [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 66-74, 1 ill., 4 tables; 14 ref. 633.31/.4/SEM/a

GLYCINE MAX; VARIETIES; HYBRIDIZATION; SELECTION; MATURITY; PRECOCITY; SEED WEIGHT; YIELDS.

The selection is intended to select a number of superior lines in accordance with the breeding objectives. The research objective was to obtain soybean line with early maturity and large seed size. A total of 796 F4 lines and the parental (Anjasmoro, Malabar, Argomulyo, Grobogan, Sinabung, Burangrang, and G100H) from 18 cross combinations were selected in the Muneng Research Station on dry season I, May to August 2009. Each line was planted along a 4.5 m single line. Plant distance was 40 cm x 15 cm, 2 plants/hill. Fertilization with 50 kg urea, 100 kg SP-36 and 75 kg KCl/ha, applied entirely at planting time. Weed control was done intensively. Pest control with insecticides was given every 10-15 days or as needed. Observations were made on maturity day (days), 100 seed weight (g), and seed yield (t/ha). The results showed that the average yield of F4 lines was 340.17 g/1.8 m^2 (equivalent to 1.85 t/ha), with the highest yield of 643 g/1.8 m^2 (equivalent to 3.57 t/ha). The maturity day ranged 71-86 days (± 76 days), while the 100 seed weight ranged from 7.2-20.6 g/100 seeds (± 12.6 g/100 seeds). Seed size distribution of 747 F4 lines was concentrated in 11-14 g/100 seeds. One of the combination crosses Anjasmoro x Grobogan had very early maturity day (72 days) and large seed size (20.2 g/100 seeds), but with very low yield. Meanwhile, one line from crossing of Malabar x G100H identified had the highest yield of 643 g/1.8 m^2 (equivalent to 3.57 t/ha), large seed size (16.7 g/100 seeds) and maturity of 80 days. Soybean lines above are expected to contribute in the development of new high-yielding soybean varieties with early maturity day and large seed size.

061 LESTARI, A.P.

Agronomic characteristics and its correlation of new plant type promising rice lines. ***Karakteristik agronomi dan korelasinya pada galur-galur harapan padi tipe baru*** / Lestari, A.P.; Abdullah, B. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)); Junaedi, A.; Aswidinnoor, H. *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 96-103, 4 tables; 21 ref.

ORYZA SATIVA; PURE LINES; AGRONOMIC CHARACTERS; PLANT BREEDING; GENETIC CORRELATION.

In a plant breeding program, knowledge of the character and interrelationships among yield and yield contributing characters are necessary. This study was carried out to identify the plant character and its correlation between yield correlated traits of 35 NPT rice promising lines with Ciherang and Sintanur as check varieties, planted in two locations, Bogor and Pusakanagara and two seasons (2009 dry and wet season, DS-WS). Those lines were planted in randomized completely block design (RCBD) arrangement, in three replications. The 21-days-old seedling planted one seed per hole, spacing 20 cm x 20 cm, with a plot size of 2 x 5 m^2/line. Plant characters varied and were significantly different from Ciherang and Sintanur as check varieties except for grain yield. B 11742-RS*2-3-MR-34-J-2-1 was the line that had the lowest plant height, grain yield, and the shortest growth duration. Most of the lines had character as new plant type variety. Grain yield positively correlated with all characters, but only significantly and positively correlated with plant height at range of 91.4 cm - 120.7 cm.

062 MANSHURI, A.G.

Vegetative and generative growth rate of early maturing soybean genotypes. ***Laju pertumbuhan vegetatif dan generatif genotipe kedelai berumur genjah*** / Manshuri, A.G. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 204-209, 5 ill., 3 tables; 16 ref.

GLYCINE MAX; GENOTYPES; PRECOCITY; MATURITY; GROWTH RATE; YIELDS.

The aim of this study was at obtaining information on plant growth rates involving leaves, stem, pods, and seeds, to be used as selection criteria in breeding program, to develop early-maturing soybean cultivar with higher yield than Grobogan variety. The experiment was carried out at ILETRI's experiment station in Ngawi, East Java during dry season I. Seeds of five soybean genotypes including Grobogan variety were planted on 24 June 2010. Growth rates of leaves, stem, pods and seed were analyzed using linear and quadratic equations. Results showed that Grobogan variety yielded the highest of 2.9 t/ha. There were no genotypes having earlier leaves growth rate (source strength) higher than that of Grobogan variety. The G2 genotype (Sinabung/Argomulyo 415-2) had higher assimilate partition rate to the seed (sink strength) compared to that of Grobogan variety, namely 0.386 g/plant/day and 0,288 g/plant/day, respectively. To improve yield potential through sink strength, a cross of G2 (Sinabung/Argomulyo) and Grobogan is suggested.

063 MARTONO, B.

Genetic variability, heritability, and correlation among quantitative characters of patchouli (*Pogostemon* sp.) derived from protoplast fusion. *Keragaman genetik, heritabilitas dan korelasi antar karakter kuantitatif nilam (Pogostemon sp.) hasil fusi protoplas* / Martono, B. (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Pakuwon, Sukabumi (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 9-15, 4 tables; 21 ref.

POGOSTEMON CABLIN; GENETIC VARIATION; HERITABILITY; GENETIC CORRELATION; PROTOPLAST FUSION.

Protoplast fusion is one of the alternatives for increasing genetic variability of patchouli. Study to estimate genetic parameters of somatic hybrids of *Pogostemon heyneaneus* (cv. Girilaya) x *P. cablin* (cv. Sidikalang and TT 75) is important in breeding program. Study on genetic variability, heritability, phenotypic and genetic correlation for some quantitative characters of somatic hybrids of patchouli derived from protoplast fusion was conducted in Cimanggu Experimental Garden. The experiment was arranged in a randomized completely block design with two replications using 33 genotypes consisting of three parents and 30 somatic hybrids as treatments. Results of this experiment showed that number of primary branches, number of leaves on primary branches, and thickness of leaves indicated narrow genetic variability, while plant height, length of primary branches, number and length of secondary branches, length and width of leaves, leaf petiole length, fresh and dry leaves production indicated wide genetic variability. Plant height, length of primary branches, number and length of secondary branches, length and width of leaves, leaf petioles length, fresh and dry leaves production showed high heritability values. Meanwhile, the characters of number of primary and secondary branches, number of leaves on primary branches and thick of leaves showed moderate to low heritability values. Most characters observed showed wide genetic variability and high heritability, except for number of primary branches, number of leaves on primary branches, and thick of leaf. Phenotypic and genotypic correlations between plant, height, number of primary branches, length of secondary branches length and width of leaves, leaf petiole length and fresh leaves production with dry leaves production were positive and significant.

064 OPRIANA, E.

Resistance of three chilli pepper genotypes to infection of two chilli veinal mottle potyvirus isolates. *Ketahanan tiga genotipe cabai terhadap infeksi dua isolat chilli veinal mottle potyvirus* / Opriana, E.; Hidayat, S.H. (Institut Pertanian Bogor (Indonesia). Fakultas

Pertanian). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 42-47, 1 ill., 5 tables; 12 ref.

CAPSICUM ANNUUM; GENOTYPES; POTYVIRUSES; PLANT DISEASES; DISEASE RESISTANCE.

Many factors influence virus replication and movement in the plant cell, among others are virulence of the virus and resistance of the infected plants. Infection of two ChiVMV isolates on three chilli pepper genotypes were assayed to observe disease development. The study was conducted in Cikabayan screen house and Laboratory of Plant Virology, Bogor Agricultural University. Three genotypes of chilli pepper with different resistance to χVMV were selected for this study, i.e. IPB C521 (highly resistant), IPB C17 (resistant), and IPB C99 (highly susceptible). Each of the genotypes was mechanically inoculated separately with virulent isolate (χVMV CKB) and mild isolate (χVMV BL) of the virus. Disease incidence and incubation period of the virus were observed based on symptom development, whereas virus titer and translocation were detected using dot immunobinding assay (DIBA). Disease incidence caused by infection of χVMV CKB and χVMV BL reached 100% on genotype IPB C99, but no disease incidence was observed on genotype IPB C521. Incubation period of χCVMV CKB was relatively shorter (7 to 9 days) than those of ChiVMV BL (9 to 14 days). Positive reaction on DIBA was strongly shown for χCVMV CKB with a high score of virus titer (5 to 6) and sensitivity up to dilution factor of $1:10^6$. This study showed that χVMV CKB had the ability to cause more severe infection on chilli pepper than χVMV BL.

065 SANTOSA, E.

Genetic variations of *Amorphophallus viabilis* Blume (*Araceae*) in Java using AFLP. *Keragaman genetik iles-iles (Amorphophallus viabilis Blume) di Jawa menggunakan Amplified fragment length polymorphism (AFLP)* / Santosa, E. (Institut Pertanian Bogor (Indonesia). Fakultas Pertanian); Sugiyama, N.; Kawabata, S.; Hikosaka, S. *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 62-68, 2 ill., 4 tables; 20 ref.

AMORPHOPHALLUS; GENETIC VARIATION; PLANT ANATOMY; GENETIC MARKERS; JAVA.

Amorphophallus variabilis Blume, a member of Araceae, is a native tuber crop in Java, Madura and Kangean Islands, Indonesia. The plant showed high variations in morphology. However, genetic variations at molecular level have not been well studied. Amplified fragment length polymorphism (AFLP) was carried out using 8 primers combination of EcoRI and MseI on 78 accessions collected from 28 sites in Java, Indonesia. Results showed that AFLP markers were able to generate polymorphism among accessions. A total of 220 polymorphisms were found. The differences among accessions at the genetic level were high, and 5 clusters were constructed. Grouping was independent of geographical origin, similar to clustering of morphological characteristic of flowers as in the previous report. Accessions from one site composed of one to four different cluster groups, showed that variation in single site was observed. Regarding conservation program of the *A. variabilis* in natural population, it is reasonable to protect one bigger site rather than many small sites, but it should be recommended to maintain conservation areas in several districts. Further study on population structure should be carried out to explain such variability.

066 SILITONGA, T.S.

Development of core collection for rice genetic resources tolerant to drought. *Pembentukan core collection untuk sumber daya genetik padi toleran kekeringan* /

Silitonga, T.S.; Risliawati, A. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 104-115, 2 ill., 4 tables; 14 ref. Appendices.

ORYZA SATIVA; GENETIC RESOURCES; GERMPLASM COLLECTIONS; GENE POOLS; DROUGHT RESISTANCE.

The experiment was conducted in dry season, July-September 2009 at the research farm in Jakenan, Central Java and planted in randomized block design (RBD) arrangement by using 150 accessions with the plot size of 5 m x 1 m, with plant spacing 25 cm x 20 cm and three replications. Another experiment used as control and grown as upland rice without drought stresses by watering twice in a week was planted in RBD arrangement with two replications, plot size 5 m x 1 m and spacing 25 cm x 20 cm. The results showed that 26 varieties were selected for subcore collection for drought tolerance. Jatiluhur and B.9645-E-Mr-89 had the highest yield potential of 3.88 and 3.77 t/ha, respectively . All of the varieties with tolerant to drought were selected for core collection. This would be very important as they could be directly grown by farmers as tolerant varieties or used as sources of gene in the breeding program to improve varieties for drought tolerant with high yielding potential.

067 SITARESMI, T.

Grain yield stability analysis of rice lines using parametric and non-parametric approach. ***Analisis stabilitas hasil gabah galur-galur padi melalui pendekatan parametrik dan non-parametrik*** / Sitaresmi, T.; Nafisah; Gunarsih, C.; Daradjat, A.A. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 79-86, 7 tables; 34 ref.

ORYZA SATIVA; GENOTYPES; STABILITY; YIELDS; STATISTICAL METHODS.

The failure of a genotype to perform relatively the same in different environments is defined as the interaction genotype x environment (G x E interaction). The existence of G x E is often causing breeders facing difficulty to select superior genotypes to be tested further. Efforts to quantify the interaction between the average yields of genotype with environment can be done by parametric and nonparametric approaches. Experiments were conducted at 16 sites in dry season of 2008 and 2009. A total of 14 rice genotypes were tested using randomized completely block design. Combined analyses of variances of 16 sites showed highly significant effects of locations, genotypes, and genotypes x locations. Parametric stability analysis using the coefficient of variability (CVi) showed 6 lines (BP1808-1F-25, BP1352-1G-KN, IR76510-24-3, BP1178-2F-26, OM 5240, OM 1490) were stable. Based on parametric analysis of variance stability (Sv), however only 3 lines namely BP1808-1F-25, S4616-PN-7-3, and IR76510-24-3 were stable. Cultivar superiority method of parametric stability showed that BP1808-1 F-25, OM 5240 and OM 1490 were stable, while OM4495 was stable based on Nassar and Huehn nonparametric methods. Results of Spearman's correlation analysis showed that between CVi and Sv, and CVi and Pi were significantly correlated with r = 0.556, and r = 0.560, respectively. It indicated that those three stability parameters had equal strength for determining the stability of the lines or cultivars tested. Based on the three stability approaches BP1808-1F-25 was considered as stable line, while check cultivar Dodokan was unstable. Parametric stability was found more accurate than nonparametric ones, when assumption of the data distribution was fulfilled.

068 SULISTIARINI, D.

Floristic study on the orchids (Orchidaceae) found in Gunung Simpang Nature Reserve, West Java [Indonesia]. ***Keanekaragaman flora anggrek (Orchidaceae) di Cagar Alam Gunung Simpang, Jawa Barat*** / Sulistiarini, D. (Pusat Penelitian Biologi, Cibinong (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 447-452, 2 ill., 1 table; 15 ref.

ORCHIDACEAE; BIODIVERSITY; BOTANICAL COMPOSITION; NATURE RESERVES; JAVA.

Species diversity of orchids in The Gunung Simpang Nature Reserve, Cianjur, West Java was investigated, where thirty three species of orchids were recorded. Two species (*Ceratostylis capitata* Z. *Trichoglottis rigida* Bl.) were regarded as endemic. Three species were new records to Java namely *Appendicula babiensis* J.J.Sm., *A. aberrans* Schltr, and *Bulbophyllum appressicaule* Ridl.

069 SULISTYOWATI, E.

Kanesia 10 - Kanesia 13: four new high yielding cotton varieties. ***Kanesia 10 - Kanesia 13: empat varietas kapas baru berproduksi tinggi*** / Sulistyowati, E.; Sumartini, S. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 24-32, 9 tables; 34 ref.

GOSSYPIUM HIRSUTUM; HIGH YIELDING VARIETIES; PEST RESISTANCE; DISEASE RESISTANCE; PRODUCTIVITY; FIBRES; QUALITY.

The cotton breeding program is focusing on the increase of productivity and fiber properties. The 1997 and 1998 crossing program involving two parents introduced from the United States of America (Deltapine Acala 90 and Deltapine 5690), three parents introduced from India (LRA 5166, Pusa 1, and SRT 1), and one variety originated from Central Asia (Tashkent 2), have resulted in nine crosses which had been tested in seven locations at East Java, West Nusa Tenggara, and South Sulawesi to evaluate their yield potentials, fiber properties, and resistance level to insect pests on rainfed areas with or without protection. Experiments were arranged in randomized block design (RBD) with three replications either with or without insecticide spray on 40-50 square plots with (100 cm x 25 cm) planting space. Insect controls were done by treating cotton seed with 10 ml Imidachloprit per kg seed and 5-6 applications of botanical pesticide Organeem (Azadirachtin 1%). Experimental results showed that Kanesia 10-Kanesia 13 yield were better when insects were controlled. Their yield potentials were 19.32, 21.75, 1705, and 21.7% higher than Kanesia 8, respectively, and means of yield were 2,457.2, 2,5073,2,410.5, and 2,506.8 kg seed cotton, respectively. Kanesia 10 and Kanesia 11 have 27.2 and 8.11 higher gin turnout, respectively than Kanesia 8. On the engineering of Kanesia 10-Kanesia 13, there was no improvement on the fiber properties, although they meet the textile industries criteria i.e. staple length 26.92 - 29.34 mm, fiber strength 27.13 - 29.50 g/tex, fiber fineness 438-5.08 micronaire, and uniformity ratio 83.3 - 84.6%.

070 SUNDARI, T.

Adaptability of soybean varieties to shading. ***Tingkat adaptasi beberapa varietas kedelai terhadap naungan*** / Sundari, T.; Wahyu A.S., G. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 124-130, 2 ill., 7 tables; 18 ref.

GLYCINE MAX; VARIETIES; ADAPTABILITY; SHADING; GROWTH; YIELDS.

The aim of this research was at identifying adaptability of 7 soybean varieties under five levels of shading. The soybean varieties tested were Tanggamus, Pangrango, Sinabung, Wilis, Ijen, Lokon, and Malabar, while the five shading treatments were: no shading (N1), 15%-15% (N1), 30%-15% (N2), 45%-15% (N3), and 60%-15% (N4). The trial in each shading environment was arranged in a randomized block design with three replications. The data collected were growth variables (leaf numbers, plant heights, and stem diameters), number of filled pods, and seed yields. Data of the seed yields were analyzed using the additive main effects and multiplicative interaction (AMMI) analysis method. Results showed that adaptability of soybean varieties to different levels of shading varied. Based on the interaction AMMI-1 biplot graph, variety Ijen was not suitable to be grown under shading environment. Varieties Sinabung and Wilis were more suitable for low level of shading environment (15%); Malabar was more suitable for moderate level of shading (45%), and Lokon was more suitable for planting under shading (60%) condition. Variety Pangrango was considered as adaptive to all levels of shading environments.

071 SUNDARI, T.

Agronomic and physicochemical characteristics of early cassava (Manihot esculenta Crantz) clones. ***Karakteristik agronomis dan fisikokimia umbi klon ubi kayu genjah*** / Sundari, T.; Yulifianti, R. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 210-218, 3 ill., 8 tables; 20 ref.

MANIHOT ESCULENTA; HIGH YIELDING VARIETIES; CLONES; MATURITY; PRECOCITY; AGRONOMIC CHARACTERS; GROWTH; YIELD COMPONENTS; YIELDS; TUBERS; CHEMICOPHYSICAL PROPERTIES; PROXIMATE COMPOSITION.

The research was aimed at characterizing agronomic characters and physico-chemical tubers of early maturating cassava clones. Total of 10 cassava clones and five varieties (UJ 3, UJ 5, Adira 1, Adira 4 and Malang 6) were evaluated in two locations, namely at the experiment station of Muneng, Probolinggo and at farmer's land in South Malang. The experiment was planted in April to November 2009, using a completely randomized block design with three replications. Each clone was planted in plots measuring 5 m x 4 m with plant spacing of 100 cm x 80 cm. Fertilization was applied in three stages by using 10 t/ha of manure and 200 kg urea + 100 kg SP36 + 100 kg KCl/ha. Manure was given at the time of land preparation, while urea, SP-36, and KCl were given at one month after planting (MAP) (100 kg of urea, 50 kg of KCl, 100 kg of SP-6/ha), and three MAP (100 kg of urea and 50 kg of KCl/ha). Observations on the agronomic characters included: plant height, number of fresh leaves, number of node and diameter of stem conducted at 3 WAP until the harvest, at intervals of 1 month. Yield and yield components, and physical-chemical characters of tuber were measured at harvest combined analyses of two locations showed that the interaction between clones and locations were significant on all observed agronomic characters. OMM 9076 clone was consistently out yielded at two locations. Based on physico-chemical characters, CMM 03001-10, CMM 03094-12, CMM 03009-6, CMM 03097-11, CMM 03013-11, CMM 03094-13, CMM 03018-10, M4-p, OMM 9076 and Adira 1 clones were considered suitable for food. Clone M4-p was also suitable for starch or flour industries, and CMM 03013-11 was suitable for ethanol.

072 SUSANTO, G.W.A.

Adaptability of promising soybean lines at different environmental conditions. *Adaptabilitas galur harapan kedelai di lingkungan yang beragam* / Susanto, G.W.A.; Adie, M.M. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 166-170, 1 ill., 5 tables; 13 ref.

GLYCINE MAX; HIGH YIELDING VARIETIES; ADAPTABILITY; ENVIRONMENTAL FACTORS; AGRONOMIC CHARACTERS; YIELDS.

High yielding varieties developed from the selected promising lines are expected to have high yield stability across agro-ecological environments. This study was aimed at determining the stability and adaptability of six promising soybean lines in seven locations of diverse environments. The research was conducted in Lampung (two locations). Yogyakarta (DIY) (one location), and East Java (four locations). The promising soybean lines tested were G100HI/SHRW-60-38, SHRW-60/G100H-73, SHRW-60/G100H-68, SHRW-60/G100H-66, G100H/SHRW-34, SHRW-60/G100H-70, and Wilis as a check. The experiment used a randomized block design with four replications. The AMMI (additive main effects and multiplicative interaction) analytical method was used to determine the lines x environments interaction. Based on the AMMI biplot through IPCA (interaction principal component axes), yields of soybean lines that close to zero point (0.0) were considered as stable. Soybean lines, location, and interaction between lines and environment (G x L) showed significant differences on grain yields. The environment variable contributed the highest (48.8%) of the total sum of squares, followed by G x L interaction variable (16%), and soybean line variable (7.4%). G x L interaction decomposition indicated that the main component IPCA1 and IPCA2 were highly significant ($P<0.05$); both contributed 86.1% of the total sum of squares of the G x L interaction. SHRW-60/G100H-70 and G100H/SHRW-34 lines were considered as stable and potentially could be recommended for planting in various soybean production areas. SHRW-60/G100H-66 line indicated a specific adaptation to environment similar to that of Ngawi. These three lines yielded an average of 2 t/ha, and therefore are considered feasible to be included on the new varietal release proposal.

073 SUSANTO, U.

Rice genotypes resistant to *Xanthomonas oryzae pv. oryzae* pathotypes III, IV, and VIII. *Ketahanan genotipe padi terhadap Xanthomonas oryzae pv. oryzae patotipe III, IV, dan VIII* / Susanto, U.; Sudir (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 108-116, 4 tables; 25 ref.

ORYZA SATIVA; GENOTYPES; XANTHOMONAS ORYZAE; BLIGHTS; DISEASE RESISTANCE.

Testing of resistance to dominant BLB pathotypes of *Xanthomonas oryzae pv. oryzae* (Xoo) bacterium were carried out on 22 IRBB isogenic lines (IL), 22 local varieties (LV), 6 new varieties (NV), one differential variety, and 49 F1 crosses of IL with NV, IL with local varieties or LV with NV. The study was conducted in the screened field of Indonesian Center for Rice Research in Sukamandi during the dry season of 2010 and west season of 2010/ 2011. Each of the experiments was arranged in a randomized block design with three replications. Three dominant pathotypes of Xoo were tested, i.e. pathotype III, IV, and VIII. The results showed that for Xoo pathotype III, there were three ILs reacted moderately resistant (MR), 18 lines moderately susceptible (MS), one line susceptible (S), 15 local

varieties resistant (R) and 7 MR; 4 new varieties were R and one new variety was MR, while 48 F1 were R and one F1 line was R. Reactions of the rice genotypes to Xoo pathotype IV indicated two isogenic lines were MR, 20 isogenic lines were S, four local varieties were MS and 18 varieties were S, 6 F1 lines were MR, one F1 line was MS, 38 F1 line were Sand 4 F1 line were highly susceptible (HS), one new variety was MS, four new varieties were S, and one new variety was HS. Resistance to pathotype IV was a complex trait that needed specific genetic combination. Reactions of rice genotypes to Xoo pathotype VIII showed 14 isogenic lines were MS and 8 were MS; 5 local varieties were MR, 10 were MS, and 7 were S; 16 F1 line were R, 25 F1 lines were MR, and 8 F1 line were MS. IRBB10 (Xa10) and IRBB64 (Xa4 + xa5 + Xa7 + Xa21) were each more resistant to Xoo pathotypes III, IV, and VIII than the other isogenic lines. The differential variety Java 14 (Xa 1, xa3, Xa12) showed MR reaction to Xoo pathotypes III, IV and VIII, and was potential to be used as a donor parent in breeding for broad spectrum resistance to BLB.

074 SUSILO, A.W.

Resistance of cocoa hybrids to vascular-streak dieback. ***Respons ketahanan beberapa hibrida kakao (Theobroma cacao L.) terhadap serangan penyakit pembuluh kayu (Vascular-streak dieback)*** / Susilo, A.W.; Sari, I.A. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 77-87, 5 tables; 18 ref.

THEOBROMA CACAO; HYBRIDS; PLANT VASCULAR SYSTEM; PLANT DISEASES; CLONES; HYBRIDIZATION; DISEASE RESISTANCE.

Breeding for VSD resistance on cocoa was carried out by intercrossing the selected clones of TSH 858, KW 162, KW 165, KEE 2, ICS 13 and NIC 7 which were selected based on the criteria of VSD resistance, productivity and cross-compatibility. This research has objective to evaluate hybrids of the crosses for VSD resistance, inheritance of the resistance and selecting the most valuable parental-clones for further crosses. Fourteen hybrids and one control were tested in the randomized completely block design with 4 blocks where in each plot containing 16 trees planted at Kaliwining Experimental Station in Jember. The resistance was evaluated in the field by scoring the symptoms in the range of 0-6 at 7 years after planting. The scores were varied significantly among the hybrids in the range of 2.19-4.53. Hybrids which were generated from the crosses of resistant clones performed lower number of the score than the hybrids generated from crosses between two susceptible clones (TSH 858 x NIC 7) which performed the highest score. The hybrids classified as resistant were TSH 858 x KW 162 (F1 and reciprocal), KW 162 x KEE 2 (F1 and reciprocal), KW 162 x ICS 13, KW 165 x KEE 2. Of the parental clones, KW 162 was the most promising parent which showed by lower score obtained when using as male or female parent compared to KEE 2 which performed quite similar of the score with TSH 858 as susceptible parent. Therefore, it could be supposed that KW 162 had better combining ability than KEE 2 where these resistant-clones showed different segregation of their resistance. The resistance was segregated by KW 162 in term of ratio 15 resistant : 1 susceptible; while KEE 2 with the ratio 1 resistant : 1 susceptible.

075 SUYAMTO

Performance of some soybean varieties on lowland Vertisols. ***Keragaan beberapa varietas unggul kedelai pada lahan sawah Vertisols*** / Suyamto; Taufiq, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang

(Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 124-134, 8 ill., 4 tables; 12 ref. 633.31/.4/SEM/a

GLYCINE MAX; HIGH YIELDING VARIETIES; AGROECOSYSTEMS; GROWTH; FLOWERING; MATURITY; YIELD COMPONENTS; YIELDS; VERTISOLS.

An adaptive soybean variety was indicated by good growth performance and high yield on certain agro ecosystem. Research to evaluate performance of ten soybean genotypes had been conducted on lowland Vertisols at Ngale Experimental Station, Ngawi District during dry season 2009 (March to June). Soybean was planted after the first rice. Randomized completely block design with three replications was applied. Basal fertilization consisting of urea, SP36 and KCl at the rate of 50 kg/ha, respectively, and applied at planting time. Result showed that eight out of ten soybean genotypes evaluated indicated adaptable on lowland Vertisols with yield more than 2.5 t/ha. They were Grobogan (2.51 t/ha) and Argomulyo (2.69 t/ha). Grobogan and Argomulyo varieties not only had high yield, but also had short maturity (73 and 71 dap, respectively). The promising line SHR/W60 had high yield and had very short maturity (69 dap) compared with Grobogan and Argomulyo. Soybean genotypes which have short to very short maturity were suitable developed for area with water limited and short planting period, and therefore they could be used to support IP 400 program on lowland with limited irrigation.

076 TASLIAH

Response of upland rice genotypes to P deficiency. ***Respon genotipe padi gogo terhadap defisiensi P*** / Tasliah; Suhartini, T.; Prasetiyono, J.; Somantri, I.H.; Bustamam, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 172-181, 1 ill., 10 tables; 32 ref.

ORYZA SATIVA; GENOTYPE ENVIRONMENT INTERACTION; NUTRIENT DEFICIENCIES; PHOSPHORUS; ALUMINIUM; APPLICATION RATES; GROWTH; YIELD COMPONENTS.

Insufficient P is a limiting factor for rice production. Tolerant varieties to deficiency P are very important to solve the problem. The objective of the experiment was to evaluate rice genotypes to P deficiency and its interaction to Al toxicity. The experiment was conducted at the green house of ICABIOGRAD (Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development) in WS 2006, using Yoshida solution. Molecular analysis was conducted in 2010 to observe the effectiveness of gene Pup1 segment in upland rice varieties to be compared with Kasalath tolerance variety from India. Plastic box of 10 l, containing solution as media was used in the experiment. The treatments were arranged in a split-split plot design with three replications. Treatments were two levels of aluminium (0 and 45 ppm Al) as a main plot, and 4 levels application of P fertilizer (0, 0.5, 5.0, and 10 ppm P) as subplot, and sixteen upland rice genotypes as sub-subplot. Results showed that there were interactions between P, Al treatments and genotypes to characters which were observed. Application of P up to 10 ppm P increased plant height, number of tillers, shoot dry weight, and root dry weight significantly, but not for root length. The effects of aluminium were decreasing in plant height, shoot and root dry weight and root length significantly, but not for number of tillers. Evaluation of tiller number for P deficiency treatment showed three cultivars were tolerant to P deficiency, namely: Way Rarem, Limboto and Sentani, and five genotypes were moderately tolerant: Way Rarem,

Jatiluhur, Sentani, K36-5-1-1, Limboto, and NIL-C443. Genotypes indicated tolerant to both Al toxicity and P deficiency, were Way Rarem, Jatiluhur, Sentani, K36-5-1-1, Limboto, and NIL-C443. There were no correlation between rice tolerance to P deficiency with rice tolerance to aluminium toxicity. Molecular analysis using Pup1 specific primers showed fully Pup1 segment on NIL-C443, K36-5-1-1, Jatiluhur, Limboto, Silugonggo, Way Rarem and those genotypes showed tolerance or moderately tolerant to P deficiency, except for Silugonggo.

077 UJIANTO, L.

Study of heritability and heterosis on hybridization between cowpea and yard long bean. ***Kajian heritabilitas dan heterosis pada persilangan antara kacang tunggak dengan kacang panjang*** / Ujianto, L.; Idris; Yakop, U.M. (Universitas Mataram (Indonesia). Fakultas Pertanian). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2012) v. 18(1) p. 9-17, 5 tables; 26 ref.

VIGNA UNGUICULATA; VIGNA UNGUICULATA SESQUIPEDALIS; INTERSPECIFIC HYBRIDIZATION; HETEROSIS; HERITABILITY.

The objectives of this research were to study the success degree of crossing and heritability on interspecific hybridization between several NTB local varieties of cowpea and several varieties of yard long bean. This research consisted of 3 stages, i.e. (1) hybridization between cowpea and yard long bean; (2) evaluation of F1 generation; (3) backcrossing between F1 with both parents. The observed data was analyzed to estimate the degree of crossability, value of broad sense heritability, and coefficient of genetic variance. The result of this research indicated that: (1) interspecific crossing between cowpea NTB local varieties and yard long bean had different degree of successful with range 31 to 57% as well as on back crossing degree of successful with range 35 to 61%; (2) the characteristic of pod length and plant height indicated the high broad sense heritability value, and (3) there was hybrid vigor for diameter of pods on all cross combinations with heterosis and heterobeltiosis values ranging 1l.4-27.0% and l0.1-18.9%, respectively.

078 UTAMI, D.W.

Use of molecular markers linked to genes for bacterial leaf blight resistance in selections for rice breeding parents. ***Aplikasi marka molekular terpaut gen-gen ketahanan penyakit hawar daun bakteri dalam seleksi tetua persilangan*** / Utami, D.W. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 152-156, 5 ill., 1 table; 12 ref.

ORYZA SATIVA; SELECTION; CROSSBREEDING; DISEASE RESISTANCE; XANTHOMONAS ORYZAE.

Bacterial leaf blight (BLB) disease caused by *Xanthomonas oryzae pv. oryzae* (Xoo) is one of the most dynamic rice pathogens. Virulence of the Xoo isolates from different regions varied considerably, as a manifestation of the dynamic host-pathogen relationships. Multigenic rice lines with a broad spectrum of BLB resistance need to be developed to deal with the dynamic Xoo population in the field. In the previous studies, a number of molecular markers linked to several BLB resistance genes had been designed. The purpose of this study was to apply some molecular markers that were linked to BLB resistance genes Xa7, Xa21, Xa26 and Xa4, on survey of the polymorphism between parents of the crossing. The rice genetic materials used in this study were Ciherang as a recurrent parent and isogenic lines

IRBB10 and IRBB66 as parental donor for the target genes of Xa41Xa26, Xa7 and Xa21. The molecular markers used for the target genes were from the previous research and basic information on nucleotide sequences of each target gene was derived from the Rice Genome Browser. The markers were applied for survey of polymorphism between the parents. The results showed that the molecular markers showed polymorphism between alleles of the donor parents (IRBB66 and IRBB10) and the recurrent parent (Ciherang). These markers were RM20589 and RM20590 for the Xa7 gene; Xa21-L02l for the Xa21 gene, Xa26-L036 for the Xa26 gene, and Xa4-L015 for the Xa4 gene. All of these polymorphic molecular markers can be applied in selection process for BLB resistance among of rice progenies from crosses of the respective parents.

079 WARDAH

Palms diversity, composition, density and its utilization in the Gunung Halimun Salak National Park, West Java-Indonesia with special reference to the Kasepuhan Ciptagelar. ***Diversitas palm, komposisi, densitas dan pemanfaatannya di Taman Nasional Gunung Halimun-Salak dengan referensi khusus pada Kasepuhan Ciptagelar*** / Wardah; Mogea, J.P. (Pusat Penelitian Biologi, Cibinong (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 453-457, 11 ill., 3 tables; 12 ref.

PALMAE; BIODIVERSITY; BOTANICAL COMPOSITION; PLANT POPULATION; USES; NATIONAL PARKS; JAVA.

Palms diversity, composition, and density in six selected sites of 15 rectangular plots of 100 m x 20 m were successfully studied. The sites are in Kasepuhan Ciptagelar, which located in the Gunung Halimun Salak National Park in West Java. The sites are in the disturbed primary submountain forest at 800 to 1,400 m altitude. Ethnobotanical observations made in some of the villages in Kasepuhan Ciptagelar proceeded through informal unending open interviews involving some traditional elders, prominent communities, and handcraftsmen. There is no species addition to the park from the Kasepuhan Cigelar. Three species of rattans (*Calamus polystachys*, *C. burckianus*, and *Korthalsia laciniosa*) are added to the park from Cibedug, Leuwijamang, Ciptarasa, and Cikidang. Young leaves of *Daemonorops rubra* are used for traditional inner Baduy cloth. The use of *C. javensis* canes for bracelets and rings, and the infructescence of *Ptectocomia elongata* for decoration are new findings.

080 WARDIANA, E.

Correlation and path analysis of several important characters of Pyrethrum (*Chrysanthemum cinerariaefolium* Trev.) germplasm collection in Gunung Putri Experimental Station (Indonesia). ***Korelasi dan analisis lintasan beberapa karakter penting koleksi plasma nutfah piretrum (Chrysanthemum cinerariaefolium Trev.) di Kebun Percobaan Gunung Putri*** / Wardiana, E.; Randriani, E.; Izzah, N.K. (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Pakuwon, Sukabumi (Indonesia)). *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 1-8, 3 ill., 4 tables; 17 ref.

CHRYSANTHEMUM CINERARIAEFOLIUM; GERMPLASM COLLECTIONS; AGRONOMIC CHARACTERS; SELECTION; STATISTICAL METHODS.

In path analysis simultaneously analyzing many characters as independent variable often causes misinformation about expected effect (relation). Effect of multicollinearity often occurs. These constraints can be decreased by using step by step path analysis and selection of independent variable with stepwise method of direct observation. The experiment was

conducted on the pyrethrum population planted at Gunung Putri Experimental Garden, Cianjur, about 1,400 m above sea level and Andosols of soil type. The research aimed at investigating several important characters of 83 clones of pyrethrum germplasm collection planted with 30 cm x 40 cm planting distance. The simple random sampling of 5 plants per clone (totally 415 samples), step by step path analysis based on plant growing cycle, confirmed model analyzed by structure equation modelling (SEM), and selection of independent variable with stepwise method were used in this study. Result showed that: (1) there are three important characters to be used in selection program of pyrethrum at early stage i.e.: number of leaflets/plant, number of tillers/plant, and height of plant. Length of corolla is important character for selection at late stage, and (2) for high yield of fresh flower, positive selection was made on number of leaflets/plant and number of tillers/plant, and negative selection was done on plant height and length of corolla.

081 WINARTI, E.
Identification, production and potential of 'kerandang' as alternative sources of food and animal feed. ***Identifikasi, produksi, dan potensi kerandang sebagai sumber pangan dan pakan alternatif*** / Winarti, E.; Sarjiman; Cahyaningrum, N. (Balai Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 122-128, 2 ill., 6 tables; 21 ref.

CANAVALIA; PLANT INTRODUCTION; PLANT PRODUCTION; FOOD RESOURCES; PROXIMATE COMPOSITION.

Kerandang is legume which grows wildly in coastal area. Kerandang utilization is expected to increase the economic value that useful for local income sources. The aim of this research was at identifying and determining the productivity and nutrient content in kerandang. This reasearch was done through two steps. First step was identification of plant species and determination of productivity and its secondary products. The second step was proximate analysis to leaf, seed, shell of seed and pod. The result showed that kerandang plant belonged to family Fabaceae, genus of *Canavalia*, species of *Canavalia virosa*. Production and nutrient content of seeds and its secondary products varied so that the species had the potential to be developed as a protein source of food and feed, while the leaves, shell of seed and pod were potential as source of ruminant feed.

F50 PLANT STRUCTURE

082 HANDAYANI, T.
Morphological characterization of potato clones in the medium land area. ***Karakterisasi morfologi klon kentang di dataran medium*** / Handayani, T.; Sofiari, E.; Kusmana (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 116-121, 2 ill., 3 tables; 18 ref.

SOLANUM TUBEROSUM; CLONES; PLANT ANATOMY.

Potato, as a subtropical plant, requires low temperature for optimum growth, especially for tuber formation (18°C). In the tropical area, potato is commonly planted at highland area. Planting of potato at medium land area may cause change on its morphological characteristics. The aim of this trial was at determining the morphological characteristics of potato plant cultivated at medium land. The trial was conducted at Majalengka (600 m asl), on April until July 2009. Eleven clones were used as treatment that were arranged in randomized block design with three replications. Observation was done on 12 morphological

characters, based on DUS Testing Guide (TG) of Potato published by Plant Variety Production office. Plant height was significantly different among clones, whereas main stem thickness and leaf size were not different among clones. Morphological characteristic of potato plant cultivated in medium land area, i.e. leaf canopy structure, growth habit, stem anthocyanin color, leaf arrangement, secondary leaf existence, flower frequency and flower color varied among the genotypes. Meanwhile the intensity of green color of leaf was not significantly different among the tested genotypes.

083 RAHAYU, A.
Morphological and chemical characteristics of seeded and seedless pummelo (*Citrus maxima* (Burn.) Merr.) cultivars. *Karakter morfologi dan kimia kultivar pamelo (Citrus maxima (Burm.) Merr.) berbiji dan tanpa biji* / Rahayu, A. (Universitas Djuanda, Bogor (Indonesia). Program Studi Agroteknologi); Susanto, S.; Purwoko, B.S.; Dewi, I.S. *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 48-55, 1 ill., 3 tables; 33 ref.

CITRUS GRANDIS; PLANT ANATOMY; CHEMICAL COMPOSITION; VITAMIN C; FLAVONOIDS.

The objective of this study was to evaluate morphological and chemical characteristics of seeded and seedless pummelo fruit. The study was carried out during April 2009 to July 2010. The pummelo fruits were harvested from the production center of Sumedang, Pati, Kudus, Magetan, Bireun (Aceh) and Pangkep (South Sulawesi). Some of seeded cultivars have spherical and ellipsoid form, while the seedless one shown pyriform shape. The edible portion of the fruits (juice vesicles) mainly affected by peel thickness and fruit shape. The edible portion of seedless cultivars (57.22%) were not significantly different with seeded (57.07%) and potentially seedless cultivars (59.35%). Generally fruit taste of seedless cultivars were sweet to sweet-bitter, meanwhile seeded and potentially seedless pummelo cultivars have sour-sweet. Pummelo juice taste was affected by TSS (total soluble solids), TA (titratable acidity), TSS/TA ratio and naringin content. Seedless pummelo cultivars have higher pH, TSS, TSS/TA ratio, vitamin C and naringin, but lower in TA content than seeded and potentially seedless fruit juice. 'Jawa 1' and 'Bali Merah 2' pummelos can be further developed as seedless superior cultivars.

F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY

084 ACHMAD
Physiological characteristics of *Pleurotus* spp. isolates. *Karakteristik fisiologi isolat Pleurotus spp.* / Achmad; Herliyana, E.N. (Institut Pertanian Bogor (Indonesia). Fakultas Kehutanan); Yurti, O.A.F.; Hidayat, A.P. *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 46-51, 2 ill., 4 tables; 13 ref.

PLEUROTUS; PLANT PHYSIOLOGY; CULTURE MEDIA; PH; TEMPERATURE; GROWTH; OXIDATION; TANNINS.

Physiological characteristics of some *Pleurotus* sp. isolates were studied *in vitro* in Bogor. Experiments to study the effect of kind of media, temperature of incubation room, and pH of medium on six isolates of *Pleurotus* sp. were arranged in factorial randomized completely design and replicated three times with colony in a petri dish as experimental units. Another physiological characters studied were the ability to oxidize tannic and gallic acids in agar medium. Results showed that isolates *Pleurotus* sp. 6 and -8 grew better in MPA medium,

Pleurotus sp. 1, -3, and -4 in MEA, and *Pleurotus* sp. 2 in PDA. Except *Pleurotus* sp. 8, other isolates could not grow in incubation room temperature of 10° and 35°C. The growth of *Pleurotus* sp. 8 was the best among the isolates in all temperature levels. Other isolates grew poorly in 20° and 29°C with diameter range was 0.2 - 2.33 cm. The growth of *Pleurotus* sp. 8 was also the best in all pH medium levels, followed by *Pleurotus* sp. 6, and then *Pleurotus* sp. 4. All isolates showed positive oxidative reaction on tannic and gallic acid agar indicated by brown color of the medium around the colony.

085 MARDIAH, Z.

Identification of volatile component of rice plant at milky and booting stage as preferred natural feed for rice-field rat. ***Identifikasi komponen volatil tanaman padi fase bunting dan matang susu sebagai pakan alami yang disukai tikus sawah*** / Mardiah, Z.; Sudarmaji (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 100-107, 3 ill., 2 tables; 24 ref.

ORYZA SATIVA; PLANT DEVELOPMENT STAGES; TISSUE ANALYSIS; VOLATILE COMPOUNDS; CHROMATOGRAPHY; FEEDS; RATS.

Rat is a major rice pest that can detect and smell feed odor better than other mammals. Rice plants at booting and milky stages are the most commonly attacked by rats. These may be due to the preference of the rat to volatile compounds available in the plants at both growth stages. Analysis of the volatile compounds was conducted at the Flavor Analysis Laboratory of the Indonesian Center of Rice Research (ICRR), Sukamandi, by a gas chromatography mass spectrometry (GCMS) using the Solid Phase Microextraction (SPME) method. There were 54 volatile compounds identified from rice plants at booting stage and 47 volatile compounds from that of milky stage. Descriptions of the volatile aromas contained in the rice plant at booting stage and milky stage were green, sweet, fatty, buttery, creamy, fruity, pungent sour, and beany.

086 RAHAJU, S.H.

Selenium content in selected herbs from volcanic area and its functional gluthathione peroxidase and cell shringkage effect on *Saccharomyces cerevisiae* JB3505. ***Kandungan selenium dalam herba terseleksi dari daerah vulkanis dan aktivitas glutation peroksidase serta pengaruhnya terhadap penyusutan sel model Saccharomyces cerevisiae JB3505*** / Rahaju, S.H. (Pusat Penelitian Biologi, Cibinong (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 427-432, 1 ill., 3 tables; 35 ref.

ALLIUM SATIVUM; PHYSALIS ANGULATA; SELENIUM; ANTIOXIDANTS; GLUTATHIONE PEROXIDASE; VOLCANIC AREAS; SACCHAROMYCES CEREVISIAE.

An exploration of selenium containing herbs was carried out in the Kerinci-Sumatra, Toraja highland-Sulawesi and Rinjani-Lombok. The herbs were sampled according to their morphophysiological characters and local etnopharmacological information. The analytical parameters were the selenium and selenomethionine content as measured by AAS and GC, respectively, gluthathione peroxidase as measured biochemically and cell model shrinkage observation to reveal the selenium containing extract effect on cellular development. The result indicates the diversity of both content and functional selenium compounds in the selected herbs. The relatively high selenium content herbs such as *Allium sativum* 1NHR had higher gluthathione peroxidase and hence its antioxidant activity. However the relatively

lower selenium content of *Physalis angulata* 33NHR was able to induce more cell model shrinkage. The phenomenon of relation among selenium based selenoamino acid, antioxidant and cell shrinkage potential need to be further studied on these selected herbs.

087 WULANSARI, D.
Effect of water and ethanol extracts of *Alpinia* spp. to *in-vitro* phagocytosis activity and capacity macrophage cells induced by *Staphylococcus epidermidis*. *Pengaruh ekstrak air dan etanol Alpinia spp. terhadap aktivitas dan kapasitas fagositosis sel makrofag yang diinduksi bakteri Staphylococcus epidermidis secara in-vitro* / Wulansari, D.; Praptiwi; Chairul (Pusat Penelitian Biologi, Cibinong (Indonesia)). *Berita Biologi* (Indonesia) ISSN 0126-1754 (2009) v. 9(4) p. 365-370, 2 ill., 2 tables; 16 ref.

ALPINIA; PLANT EXTRACTS; ETHANOL; MACROPHAGES; PHAGOCYTOSIS; IMMUNOSUPPRESSANTS; STAPHYLOCOCCUS EPIDERMIDIS; IN VITRO.

Ethanol 70% and water extracts of *Alpinia* spp. i.e. *Alpinia zerumbet*, *A. katsumadai*, *A. malaccensis* and A. *officinarum* were examined for their impact in *in-vitro* phagocytosis activity and capacity of mice (*Mus musculus*) peritoneum macrophage induced by *Staphylococcus epidermidis*. The extract concentrations used in this experiment were 0; 0.1; 1.0; 10; 100; and 1000 µg/ml, Imboost (*Echinacea purpurea* extract) 1000 µg/ml was used as positive control while distilled water as negative control. The assay results showed that all of the extracts were active to promote phagocytosis activity and capacity of macrophage cells. The phagocytosis acitivity and capacity were increased by increasing extract concentration, and ethanol extract showed better activity than water extract. *Alpinia officinarum* and *A. katsumadai* extracts revealed better phagocytosis activity and capacity than others. Activity and capacity of phagocytosis of each concentration was significantly ($P<0.05$) different each other as well as with negative control. There was significant difference among each extracts and positive control at 1000 µg/ml.

F62 PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT

088 ASTUTI, Y.T.M.
Effect of flush existence, NAA and GA application on cocoa pod development. *Pengaruh keberadaan tunas, aplikasi naphtalene acetic acid dan gibberellic acid terhadap perkembangan buah muda kakao* / Astuti, Y.T.M. (Institut Pertanian STIPER, Yogyakarta (Indonesia). Fakultas Pertanian); Prawoto, A.A.; Dewi, K. *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(1) p. 11-23, 6 tables; 31 ref.

THEOBROMA CACAO; NAA; GIBBERELLIC ACID; BUDS; PODS; TISSUE CULTURE.

This experiment was carried out to study the photosynthate allocation between flush and young pods, and the effect of naphthalene acetic acid and gibberellic acid application to sink strength. Two cocoa clones KW 163 and KW 165 located in Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute were used on this experiment. Each clone was treated with flushes and without flush. The young pods sprayed with NAA 250 mg L/1, GA 250 mg L/1, NAA 250 mg L/1 and GA 250 mg L/1 and control (K = without NAA and GA). There were 2 x 4 treatment combinations for each clone, and replicated three trees for each combination. The parameter were cherelle wilt percentage, sucrose content, fresh and dry weight, long and diameter of healthy and wilting pods. The result showed that sink strength of young pods was lower than that of flushes, which caused

proportion of photosynthate translocation to the young pods was lower. NAA and GA application to the pods could improve sucrose allocation, increased pod weight and suppressed cherelle wilt. The lack of photosynthate on young pod caused metabolism change, so pod became cherelle wilt. But, the optimum concentration and method of application of those growth regulators to obtain minimum cherelle wilt was still unknown.

089 DEVY, N.F.

Flavonoid and limonoid contents in every growth phase of kalamondin (*Citrus mi*tis Blanco) and purut (*Citrus hystrix* Dc.). *Kandungan flavonoid dan limonoid pada berbagai fase pertumbuhan tanaman jeruk kalamondin (Citrus mitis Blanco) dan purut (Citrus hystrix Dc.)* / Devy, N.F.; Yulianti, F.; Andrini (Balai Penelitian Tanaman Jeruk dan Buah Subtropika, Malang (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2010) v. 20(4) p. 360-367, 6 ill., 2 tables; 16 ref.

CITRUS MITIS; FLAVONOIDS; CAROTENOIDS; BIOCHEMISTRY; SPECTROMETRY; VITROPLANTS.

Citrus contains secondary metabolites such as flavonoid, carotenoid, and limonoid, which can be found in the leaf, peel of fruit, seeds and pulp. The aims of this research were to determine flavonoid and limonoid contents in every growth phase of kalamondin and purut and the limonoid contents in embryo and plantlet phases derived from *in vitro somatic embryogenesis*. The research was conducted in Indonesian Citrus and Subtropical Fruits Research Institute (ICISFRI) from May to December 2009. The research consisted of two activities as follows: (1) analyses of flavonoid and limonoid contents in every growth phase of kalamondin and purut and (2) analyses of the limonoid contents in embryos and plantlet proliferated from *somatic embryogenesis* culture. Flavonoid and limonoid contents were analyzed at the Assessment Service Unit, Faculty of Pharmacy, Airlangga University. The result showed that flavonoid and limonoid compounds could be produced in all parts of plant such as pulp, seeds, peel of fruit, and leaves from every growth phase of kalamondin and purut. In purut and kalamondin, the highest flavonoid content was obtained from ripen fruit, with concentration of 18.8 ppm. Limonoid content in purut was detected only in leaf supporting ripen fruit (1 ppm) and seeds (61 ppm), and in kalamondin was only in seeds with concentration of 74 ppm.

H10 PESTS OF PLANTS

090 BAEHAKI S.E.

Roles of resistance rice varieties on decreasing population of brown planthopper biotypes 4. *Peran varietas tahan dalam menurunkan populasi wereng coklat biotipe 4 pada tanaman padi* / Baehaki S.E.; Arifin K.; Munawar, D. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 145-153, 13 tables; 13 ref.

ORYZA SATIVA; VARIETIES; NILAPARVATA LUGENS; NYMPHS; PEST CONTROL; INSECTICIDES; POPULATION DYNAMICS; DAMAGE; YIELDS.

Research was carried out in a screenhouse at Indonesian Center for Rice Research and in the rice field at Pati, Central Java, during the Wet Season 2009. Design of each experiment was factorial with three replications. The first factor consisted of four varieties, namely IR-74, Ciherang, Hipa 4, and Muncul. The second factor consisted of three insecticides, namely imidackloprid, BPMC, and deltamethrin. Results of the screen house trial showed that

varieties IR-74 and Ciherang were able to reduce nymph population of brown planthopper (BPH) biotype 4 generation 1 (G1) from Pati, Central Java, by 52.9% and 19.1%, respectively. Variety IR-74 reduced nymph population of BPH biotype 4 generation 2 (G2) by 39.8%. The insecticides effectiveness (IE) values of imidackloprid, BPMC, and deltamethrin treatments at dosages 0.5 kg/ha; 1.5 l/ha, and 0.25 l/ha, respectively, against BPH biotype 4 Generation 1 (G1) and Generation 2 (G2) were less than 50%. Insecticides imidackloprid, BPMC, and deltamethrin each was not effective against the BPH. On the other hand, IE of imidackloprid, BPMC, and deltamethrin at the recommended dosages to BPH biotype 1 G1 in the screenhouse were 99.8%; 50.6% and 24.7%, respectively. Results of the field trial in Pati showed that varieties IR-74, Ciherang, Hipa 4, and Muncul prior to 65 days after transplanting (DAT) did not reduce the BPH populations, but at 75 DAT, varieties IR-74 and Ciherang reduced the BPH populations up to 52.3% and 66.1%, respectively. Decrease in the BPH population by imidackloprid ranged from 20.1-52.4% and by BPMC from 9.2-26.4%. Yield of IR-74 which resistant variety to BPH biotype 3 was significantly higher than that of Ciherang with a yield different of 3,263 kg/ha.

091 BALIADI, Y.

Natural biopesticide controlled white fly on soybean. ***Pengendalian kutu kebul pada tanaman kedelai dengan insektisida nabati*** / Baliadi, Y.; Sari, K.P. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian Malang, (Indonesia)) [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 329-341, 4 ill., 1 table; 40 ref. 633.31/.4/SEM/a

GLYCINE MAX; BEMISIA TABACI; DISEASE CONTROL; BIOPESTICIDES; EXTRACTS; PUPAE; NYMPHS; SURVIVAL.

The white fly *Bemisia tabaci* Gennadius is one of key pest and obligate vector of cowpea mild mottle virus of soybean in Indonesia. The insect control mainly depends on the use of synthetic insecticides. However, the increasing resistance of *B. tabaci* to insecticides provides an impetus to use integrated pest control measures, including biopesticides. The objective of the research was to evaluate aqueous extracts of seed and leaf of eight botanical insecticides to *B. tabaci* oviposition and survival of nymphs and pupae. The experiments were performed in randomized completely block design, 10 treatments, with three replicates. Ten treatments examined were: 1) coconut oil (*Cocos nucifera*); 2) aquoeus extracts of pogostemon leaves (*Pogostemon cablin*); 3) aquoeus extract of tobacco leaves (*Nicotiana tabacum*); 4) aquoeus extract of swietenia seed (*Swietenia mahogany*); 5) aquoeus extract of annona seed (*Annona squamosa*); 6) aquoeus extract of aglaia leaves (*Aglaia odorata*); 7) aquoeus extract of neem seed (*Azadirachta indica*); 8) aquoeus extract of cacao fruit skin (*Theobroma cacao*); 9) dellametrin, and 10) water as control. Results of the experiments revealed that botanical insecticides applied at 8, 15, and 22 days after sowing were significantly influenced the number of egg laid, unhatched eggs, nymphs and pupae developed. It concluded that neem seed, *A. odorata* leaf and *A. squamosa* seed has insecticidal activities which effective to control white fly on soybean.

092 BEDJO

Effectiveness of SlNPV isolates originated from acid soil against soybean armyworm. ***Keefektifan isolat Spodoptera litura-nuclear polyhedrosis virus asal lahan masam terhadap ulat grayak*** / Bedjo (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)), [Technological innovation acceleration supporting production

increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 270-276, 3 tables; 19 ref. 633.31/.4/SEM/a

GLYCINE MAX; SPODOPTERA LITURA; LARVAE; PEST CONTROL; NUCLEAR POLYHEDROSIS VIRUS; MORTALITY; CROP LOSSES; YIELDS.

The soybean armyworm, *S. litura*, is considered as a major pest of soybean which cause yield loss up to 85%. With the increased environmental awareness from the chemical insecticides, the demand for nature-based biopesticides likes *Spodoptera litura*-Nuclear Polyhedrosis Virus (SlNPV) has been increasing. The SlNPV offer several advantages over chemical pesticides, i.e. it is safer, more targeted activity against a desired pest, can supplement the chemical insecticides when used in integrated pest management (IPM) programs. This research is aimed at evaluating the effectiveness of six SlNPV isolates originated from acid low and dry land. The research was conducted at Muneng and Kendalpayak Research Station, using a randomized block design, six treatments, and three replicates. The treatments were: 1) SlNPV JTM 05a, 2) SlNPV JTM 05c, 3) SlNPV JTM 05e, 4) SlNPV JTM 05f, 5) SlNPV Lpng 05a, and 6) SlNPV SmtrSl 05b. The plot size for each treatment was 4 m x 5 m, in which 2-3 soybean seeds of variety Wilis were sown with 40 cm x 20 cm plant distance. The experimental plants were fertilized using 75, 100, and 100 kg/ha of urea, SP-36 and KCl, respectively. The weeding was done at 14 and 28 days after sowing (DAS). The bean fly, and leaf feeding were control using sidametrin and lamda sihalotrin at 8, 14, 21, and 28 DAS. The results revealed that three of six isolates evaluated, i.e. SlNPV JTM 05a, SlNPV Lpng O5a, and SlNPV SmtrS1 05b highly effective against *S. litura* with larvae mortality rate between 82-100% at 4-7 days after SlNPV application. These SlNPV isolates were suggested and proposed to be used as biopesticide to control the soybean armyworm.

093 HASYIM, A.

Efficacy and persistence of citronella oil as a biopesticide against *Helicoverpa armigera* Hubn. *Efikasi dan persistensi minyak serai sebagai biopestisida terhadap Helicoverpa armigera Hubn. (Lepidoptera: Noctuidae)* / Hasyim, A.; Setiawati, W.; Murtiningsih, R.; Sofiari, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* (Indonesia). ISSN 0853-7097 (2010) v. 20(4) p. 377-386, 3 ill., 5 tables; 34 ref.

HELICOVERPA ARMIGERA; CYMBOPOGON; OILS; ANTIFEEDANTS; BIOPESTICIDES; REPELLENTS; TOXICITY; PESTICIDE PERSISTENCE; LARVAE; BOTANICAL INSECTICIDES.

Fruit borer, *Helicoverpa armigera* (Hubn.) is one of the key pests of chili pepper in Indonesia. Yield loss due to this insect pest is up to 60%. The chemical treatment for controlling this insect pest is ineffective and eventually leads to environmental pollution. Studies were conducted to assess the biological activity of citronella oil against tomato fruit worm, *H. armigera* from June to December 2009 at the Laboratory and the Screenhouse at Indonesian Vegetables Research Institute. All the bioassays were conducted under controlled environmental conditions (27 ± 2°C and 75-80% RH). Four bioassay steps were performed, i.e. the effect of citronella oil on percentage repellency of second instar larvae of *H. armigera*, the antifeedant effect of citronella oil against third instar larvae of *H. armigera*, toxicity of citronella oil on first, second, and third instar larvae of *H.armigera* and persistence of citronella oil effect of mortality of *H. armigera*. The results indicated that

citronella oil significantly repellened to second larvae of *H. armigera* with the repellency level of relative lowest II (20-40%) and III (40-60%). Applications of citronella oil at 3,000 until 5,000 ppm concentrations reduced food consumption index, growth rate, approximate digestability, efficiency of conversion of digested food and feeding deterrent was reduced by 50%. Citronella oil significantly decreased growth and development of both pupal male and female of *H. armigera*. The percentage of mortality rate varied significantly among the *H. armigera* larvae tested and the values of LC_{50} for first, second, and third larvae instar of *H. armigera* were 12,795.45; 8,327.42, and 3,324.89 ppm, respectively. Meanwhile LC_{95} value at the first, second, and third larvae instar of *H. armigera* were 10,564.59; 12,535.12, and 4,725.30 ppm, respectivelly. Residual activity of citronella oil were found to be moderately toxic to *H. armigera*. The residue of citronella oil on food of *H. armigera* was about 1-4 days after treatment. However, toxicity decreased significantly after 5 days. These results clearly showed that citronella oil was not persistent to the environment due to its volatile nature. These results suggested that the application of citronella oil is potential to be used as an ideal eco-friendly approach for the control of the agricultural pests *H. Armigera.*

094 KARDINAN, A.

Utilization of *Ocimum* spp. on controlling fruit flies on mango. *Penggunaan selasih dalam pengendalian hama lalat buah pada mangga* / Kardinan, A. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)); Bintoro, M.H.; Syakir, M.; Amin, A.A. *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(3) p. 101-109, 3 ill., 3 tables; 24 ref.

MANGIFERA INDICA; OCIMUM; BACTROCERA DORSALIS; TEPHRITIDAE; BOTANICAL PESTICIDES; PEST CONTROL.

Research was conducted by evaluating the effectiveness of farmers technology (indigenous knowledge) in formulating botanical pesticide for controlling fruit flies (fruit flies attractant), compared to fruit flies attractant formulated in the laboratory of Indonesian Medicinal and Aromatic Research Institute (IMACRI) and commercial fruit flies attractant. Research was arranged by randomized block design, four treatments and six replications. Treatments consisted of (1) farmers technology, i.e. distilled water of basil (*Ocimum* spp.), (2) farmers technology, i.e. essential oil of basil (*Ocimum* spp.), (3) essential oil of basil formulated in IMACRI, and (4) commercial attractant. Each formula was dropped as much as 0.25 ml on cotton bud, except distilled water of basil which is applied by dipping the cotton bud into the distilled water, placing it in the trap made from 600 ml volume drinking water, then hanging it as high as 2 m on the mango tree. Dropping of formula was done just one time to evaluate the duration of attractant on trapping fruit flies in the field. Observations were done every week on the number, species, sex ratio of fruit flies trapped, and the duration of attractant ability on trapping fruit flies in the field. The active ingredient of formula was analyzed by gas chromatograph conducted in IMACRI. The social and economic aspects were done by interviewing the farmers through questionnaires. The number of the farmers interviewed were 30 farmers, including the trader of mango. Result showed that indigenous technology of the farmer was effective and efficient since it could decrease the use of pesticide as much as 62% and decrease fruit damage as much as 34% and increase their income as much as 73%. Technology of farmers in the form of distilled water of basil could stand as long as a week on trapping fruit flies, hence its application must be repeated every week. Meanwhile in the form of essential oil could stand for one month and is not significantly different with attractant formulated in IMACRI, even better than commercial attractant, hence its application could be done every month. Only male fruit flies could be trapped and the most of them consisted *Bactrocera dorsalis* spesies (97%) and the rest was *Bactrocera umbrosus* species (3%). The active ingredient content (methyl eugenol-C12 H_24O_2) in the distilled

water of basil was 0.43%. Meanwhile in essential oil of the farmer was 77.9% and in essential oil of IMACRI was 73.6% and in commercial attractant was 75%

095 RAHMINI

Biological responses of brown planthopper, *Nilaparvata lugens* Stal (*Hemiptera: Delphacidae*) to biochemical factors of rice. *Respon biologi wereng batang coklat terhadap biokimia tanaman padi* / Rahmini (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)); Hidayat, P.; Ratna, E.S.; Winasa, I W.; Manuwoto, S. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 117-123, 2 ill., 4 tables; 23 ref.

ORYZA SATIVA; NILAPARVATA LUGENS; ANIMAL PHYSIOLOGY; SUCROSE; OXALIC ACID; PEST RESISTANCE.

In developing rice varieties resistant to brown planthopper (BPH), information on responses of the BPH to the rice plants were needed. The aim of the research was to study the biological responses of BPH on biochemical factors of some rice varieties. The study was conducted on June 2010 to April 2012 in Muara Research Station, Indonesian Center for Rice Research (ICRR) and at Laboratory of Physiology and Toxicology, Plant Protection Department, Bogor Agriculture University. The biological responses of the BPH to rice varieties were studied in terms of adult settling preference, feeding activity using the honeydew test, and life table analysis. The biochemical factors of the rice varieties, namely sucrose and oxalic acid contents were analyzed. Rice varieties TN1 (no resistance gene), IR-26 (Bph1), IR-42 (Bph2), IR-64 (Bph1+), IR-74 (Bph3), PTB33 (Bph2+Bph3), and Inpari13 (unknown resistance gene) were used in this study. The BPH showed similar non-preference reactions to the resistant varieties and Inpari13 for settling. Feeding activity of the adult female BPH was the highest on the susceptible variety TN1 and the lowest on the resistant variety PTB33. The highest mortality of BPH occurred at larval stages, especially in the first and second instars. The intrinsic rate of population growth (rm) and net reproductive rate (Ro) of the BPH were higher on the susceptible variety TN1, but the doubling time (DT) was shorter than those on the resistant varieties. The resistant variety PTB33 contained high oxalic acid and low sucrose. On the contrary, the susceptible variety TN1 contained low oxalic acid and high sucrose. These biochemical factors contributed in rice plant resistance to BPH.

096 SATOTO

Yield stability and resistance to bacterial leaf blight and tungro of hybrid rice varieties Hipa 7 and Hipa 8. *Stabilitas hasil padi hibrida varietas Hipa 7 dan Hipa 8 dan ketahanannya terhadap hawar daun bakteri dan tungro* / Satoto; Widyastuti, Y.; Rumanti, I.A.; Sudibyo T.W.U. (Balai Besar Penelitian Tanaman Padi, Sukamandi (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 129-135, 8 tables; 29 ref.

ORYZA SATIVA; VARIETIES; HYBRIDS; NILAPARVATA LUGENS; XANTHOMONAS ORYZAE; TUNGRO DISEASE; DISEASE RESISTANCE; PEST RESISTANCE; YIELDS; QUALITY.

Field trials were carried out to evaluate the yield potential and grain quality of seven rice hybrids, including Hipa 7 and Hipa 8, and their responses to BLB diseases. The hybrids were tested in ten locations, namely at four locations during the wet season (Klaten, Boyolali, Jember, and Banyuwangi) and at six locations during the dry season (Batang, Grobogan,

Subang, Jember, Banyuwangi, and Subang). In each location the experiment was arranged in a randomized completely design with three replications. Data on grain yield was collected and then was converted into grain yield per hectare. Combined analyses was compiled for all test locations. The resistance of the hybrids to brown plant hopper, bacterial leaf blight, and tungro were tested in the laboratory and screenhouse of the Indonesian Center for Rice Research. Results of the study showed that across locations Hipa 7 and Hipa 8 yielded 7.63 t/ha and 7.68 t/ha, respectively, which were 11% higher than that of inbred variety Ciherang. The highest yield of Hipa 7 was 11.42 t/ha, while that of Hipa 8 was 10.40 t/ha. Based on the yield stability analysis. Hipa 7 and Hipa 8 were found adapted to all test locations, suggesting that these hybrids are suitable for diverse ecosystems. Hipa 7 was resistant to tungro virus, susceptible to brown planthopper biotype 3, and moderately susceptible to *Xanthomonas oryzae pv. oryzae* (Xoo) pathotype IV and VIII. Hipa 8 was moderately resistant to tungro virus, moderately resistant to Xoo pathotype IV, moderately susceptible to Xoo pathotype VIII, and susceptible to brown planthopper biotype 3. Hipa 7 and Hipa 8 had 22% and 23% amylose content, respectively, with soft rice texture. Head grain rice percentage of Hipa 7 and Hipa 8 was 90.81% and 84.81%, respectively. The grain milling recovery of both hybrids were also high, up to 80.87% for Hipa 7 and 78.60% for Hipa 8. The hybrids are expected to be more readily adopted by farmers and accepted by consumers.

097 SUDIRMAN

Effect of increasing ammonium concentrations on development of *Meloidogyne javanica* in tomato root culture. *Pengaruh peningkatan konsentrasi amonium terhadap perkembangan Meloidogyne javanica pada kultur akar tomat* / Sudirman (Universitas Mataram (Indonesia). Fakultas Pertanian). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 393-402, 8 ill., 27 ref.

LYCOPERSICON ESCULENTUM; ROOTS; TISSUE CULTURE; AMMONIUM; MELOIDOGYNE JAVANICA; DEVELOPMENTAL STAGES; INHIBITION.

Research was aimed at knowing the effect or increasing ammonium concentrations on *Meloidogyne javanica* development in tomato roots growing in axenic culture. Egg masses of *M. javanica* were exposed to deficient ammonium concentration (1.5 ppm $NH4^+$) in a nutrient agar medium upon which tomato roots were growing. One week after inoculation, stages of nematode development were recorded and infected tomato roots were aseptically transferred into nutrient agar media with four different ammonium concentrations (1.5, 9.0, 54 and 324 ppm $NH4^+$). Stages of nematode development inside roots were then observed at weekly interval for three weeks. Results of the research showed that increasing ammonium concentration after root infection suppressed nematode development. In roots transferred to high ammonium concentrations, fewer nematodes matured and most of those that did were males. In addition, there were also fewer galls and lower root dry weights in increased ammonium than those with constant low ammonium concentration.

098 SUPENO, B.

Parasitoid moth (*Lepidoptera: Epipyropidae*) on cashew planthopper at cashew plantation in Lombok [Indonesia]. *Ngengat parasitoid (Lepidoptera: Epipyropidae) pada wereng pucuk mete di pertanaman jambu mete di Pulau Lombok* / Supeno, B. (Universitas Mataram, Lombok (Indonesia). Fakultas Pertanian); Buchori, D.; Pudjianto; Kartosuwondo, U.; Schulze, C.H. *Jurnal Penelitian Tanaman Industri* (Indonesia). ISSN 0853-8212 (2009) v. 15(1) p. 16-23, 7 ill., 3 tables; 20 ref.

ANACARDIUM OCCIDENTALE; LEPIDOPTERA; PARASITOIDS; PARASITISM; LARVAE; INFESTATION; POPULATION DYNAMICS.

Sanurus indecora Jacobi is a serious pest attacking cashew plantation in Lombok Island. A number of natural enemies of flatids were found on cashew plantation such as predator, pathogen, and parasitoid. All members of Epipyropidae (Lepidoptera) are ectoparasitoid on planthoppers and leafhoppers (Homoptera). The first report on Epipyropidae in Indonesia was documented in Lombok where Epipyropidae parasitized *S. indecora*. Study was conducted to determine the prevalence of parasitoid moth on *S. indecora* at Lombok upland cashew plantations. This experiment was conducted in three village areas of Gangga, Kayangan, and Bayan Districts. The results showed that population of *Sanurus indecora* increases gradually from April until October (dry season) and decreases from November until March (rainy season), with the highest population occurs in August to October. Epipyropidae attacks both male and female of *S. indecora* J. Parasitization rate of male ranges from 0.38 - 46.00% with an average of 8.96%. Parasitization rate of female varies from 8.77 - 38.52% with an average of 17:45% Epipyropidae is a solitary and or gregarious parasitoid. The parasitization rate was negatively correlated with *S. indecora* population. The numbers of Epipyropidae larvae were correlated with the numbers of *S. indecora* infected.

099 TRIYOGO, A.
Role of insect as vector of gall rust disease on *Albizia falcataria* L. Fosberg. *Peran serangga sebagai vektor penyakit karat puru pada sengon (Albizia falcataria L. Fosberg)* / Triyogo, A.; Widyastuti, S.M. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Kehutanan). *Jurnal Agronomi Indonesia* (Indonesia). ISSN 2085-2916 (2012) v. 40(1) p. 77-82, 10 ill., 2 tables; 23 ref.

PARASERIANTHES FALCATARIA; INSECTA; VECTORS; RUSTS; UREDINALES.

Sengon (*Albizia falcataria* L. Fosberg) forest plantations of community in Wonosobo District, Central Java were attacked by gall rust disease. The objective of this research was to investigate the role of insects as a vector of gall rust disease. The attack intensity was measured in the different ages of tree stand (1, 2, 3, 4, and 6 year old) with randomized completely block design (RCBD) consisting of 3 blocks, 3 replications, and 3 sampling plots. The role of insect as a vector was tested using two different approaches: observation on the spores in the adult insect integument and artificial infestation of insect containing spores on the healthy seedlings. The result of this research showed that the one year old of sengon had the highest disease intensity (95.5%) and the lowest disease incidence (56.96%). The identification showed that the insect belongs to Lepidoptera (Family Heliozelidae) completing the metamorphosis in the gall. Spores were found in the integument of Lepidoptera (Family Heliozelidae*)* at the average of 2.8 x 10^4 spores/µl/insect. Artificial inoculation on healthy seedling did not show the infection symptoms by *Uromycladium tepperianum* until 5 weeks after inoculation.

H20 PLANT DISEASES

100 DEWI, I.S.
Agronomic characters and resistance of several dihaploid maintainer lines to bacterial leaf blight. *Karakter agronomi dan ketahanan beberapa galur pelestari dihaploid terhadap hawar daun bakteri* / Dewi, I.S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Rumanti, I.A.;

Purwoko, B.S.; Kadir, T.S. *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 88-95, 3 ill., 4 tables; 23 ref.

ORYZA SATIVA; XANTHOMONAS ORYZAE; BLIGHTS; AGRONOMIC CHARACTERS; DISEASE RESISTANCE; DIHAPLOIDY.

Bacterial blight (*Xanthomonas oryzae pv. oryzae*, Xoo) is one of the most serious diseases of rice in Indonesia. From previous research thirteen lines of dihaploid (DH) maintainer lines-derived anther culture were selected for developing cytoplasmic male sterile lines. In this research those DH maintainers were evaluated for their agronomic characters such as plant height, number of productive tiller, and seed weight per hill as well as their resistance to bacterial leaf blight (BLB) pathotypes III, IV and VIII at Indonesian Center for Rice Research Institute (ICRR), Sukamandi during wet season 2008/2009. The results showed that 10 DH maintainer lines, i.e. BioMAcI8-H36-3-Ma, BioMAcI9-H36-3-Mb, BioMAc20-H36-3-Mc, BioMAc21-H36-4-M, BioMAc26-B l-l-Mb, BioMAc29-B2-I-Db, BioMAc31-B2-I-M, BioMAc33-B2-4-Pb, BioMAc34-B4-1-Da and BioMAc35-B4-1-Dc had plant height ranged from 88.79-104.08 cm, productive tiller ranged from 9 to 13 tillers/hill. Among those DH maintainer lines three lines were resistant to BLB pathotype III, i.e. BioMAc26-B1-1-Mb, BioMAc29-B2-1-Db and BioMAc31-B2-1-M lines, and two lines, i.e. BioMAc21-H36-4-M and BioMAc35-B4-1-Dc were highly resistant to BLB pathotype VIII. Only BioMAc35-B4-1-Dc line was highly resistant to BLB pathotype IV.

101 HARDANINGSIH, S.

Evaluation of soybean genotypes for partial resistance to rust disease. *Evaluasi genotipe kedelai untuk ketahanan terhadap penyakit karat* / Hardaningsih, S. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 307-317, 3 tables; 13 ref. Appendices. 633.31/.4/SEM/a

GLYCINE MAX; PHAKOPSORA PACHYRHIZI; SYMPTOMS; GENOTYPES; DISEASE RESISTANCE; GROWTH; YIELD COMPONENTS; YIELDS.

Rust disease is the major disease of soybean in Indonesia. Spray fungicide is effectively control the rust disease. However planting resistant variety is the best way as an alternative control to avoid negative effect of air pollution. The objective of the experiment is to determine parsial resistance of rust disease. Fifty soybean genotypes were planted in 10 kgs plastic polybag with four replicates, and inoculated by 10^4 rust spores/ml at 3 weeks after planting (WAP). The observation showed the level of disease was increased from 7 to 9 WAP except on Msr/SJ-5-23-4-1-5 genotype. Fourteen genotypes which disease intensity less than 50% was selected, among them were: G 100 H/Shr w 60-199-180-34-38, SV-7-1011-1-1 (22,50%), and Msr/SJ5-23-4-1-5 (5%). There was significant difference among the genotypes, based on the number of pustules and uredia. The genotype which had less number of pustules/uredia was more resistant than the others. The seven selected genotypes based on number of pustules per 25 mm^2, and one of them was genotype Shr w 60/IAC.100-36-47-45-16 (5 pustules/25 mm^2). Based on number of uredia was selected 4 genotypes, SC2P2P3-5-4-1-5 (8 uredia), SJ-5/Msr-99-5-4-5-1-6-1 (9 uredia), Msr/SJ-5-21-3-7-3-21-1 (6 uredia), and Msr/SJ-5-23-4-1-5 (4 uredia).

102 HARDANINGSIH, S.

Identification of causal agent of brown leaf blight and resistance evaluation of some soybean lines and improved varieties. ***Identifikasi dan evaluasi ketahanan beberapa galur dan varietas kedelai terhadap penyakit hawar daun coklat*** / Hardaningsih, S.; Hadi, M. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 299-306, 3 ill., 1 table. 633.31/.4/SEM/a

GLYCINE MAX; VARIETIES; GENOTYPES; PLANT DISEASES; CORDANA; IDENTIFICATION; DISEASE RESISTANCE.

The common diseases of soybean are anthracnose, rust, *downy mildew*, and *Cercospora* leaf spot, which causes by *Colletotrichum dematium* var truncatum, *Phakopsora pachyrhizi*, *Peronospora manshurica*, and *Cercospora sojae*. The young plants (3-5 weeks) grown in the ILETRI-Experimental Station and the screen house often infected by a disease which showed the leaf blight symptom. In the severe infection, leaf spot become blighting, and leaf become drying and dying. This disease was endemics, but did not got attention because the incidence just in several plant and the disease intensity was low. The causal agents of the disease has not been identified and need to be observed. The identification and evaluation of 16 soybean lines originally from National Nuclear Agency ("Batan"), compared with four improved soybean varieties, was conducted at Mycology Laboratory, ILETRI in October 2009. The identification showed that the suspected pathogen is *Cordana* sp. The four of six improved varieties tested were more susceptible than the "BATAN" lines, (with average 5% intensity). Rajabasa was the most susceptible varietiy (51.3%), while Muria and Panderman were moderately susceptible variety (44.6% and 36%, respectively), Wilis and Tidar were moderately resistant vaerieties (25% and 10%, respectively), Tidar was moderately resistant (10%), and Anjasmoro was the resistant one.

103 KIRNOPRASETYO, I.

Transformation of chitinase and glucanase genes induced resistance of soybean against fungal disease. ***Transformasi gen chitinase dan glucanase untuk peningkatan ketahanan tanaman kedelai terhadap penyakit cendawan*** / Kirnoprasetyo, I.; Sulistyowati, L.; Widoretno, W. (Universitas Brawijaya Malang (Indonesia)); Suharsono [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 188-200, 5 ill., 7 tables; 23 ref. 633.31/.4/SEM/a

GLYCINE MAX; VARIETIES; DISEASE RESISTANCE; FUNGAL DISEASES; GENETIC TRANSFORMATION; CHITINASE; BETA GLUCANASE; VITROPLANTS.

In Indonesia, soybean is severely infected by number of fungal diseases attacked on root, stem, leaves and pods and cause significantly yield loss. In spite of conventional breeding, to develop disease resistant plant as a component of disease management, genetic transformation has now become an alternative in developing resistant plant through transformation of chitinase and glucanase gene. Cell wall of most fungus is composed by

chitin and betha-1, 3-glucan. Therefore, with insertion of chitinase (Chn) and glucanase (Glu) genes that breakdown the cell wall, the fungus invasion will die. Researches were conducted at the Laboratory of Biotechnology Department of Plant Protection and Laboratory of Tissue Culture of Department of Biology, University of Brawijaya in 2007-2009. The objective of the research was to develop fungal disease resistance through Chn and Glu transformation using vector *Agrobacterium tumefaciens* and gene construct of Ag440::pB2GW7::cDNA-ChFR and Ag440::pB2GW7:: cDNA-GFR, respectively into cotyledon, cotyledon and hypocotyl callus. The results showed that these two genes were inserted into soybean as expressed in histochemical, immuno-histochemical, and PCR analysis. The transgenic soybean (transforman plant) was now available and a further test against fungal disease was needed.

104 OCTRIANA, L.

Potential of biological agents to inhibit growth of *Phytium sp. in vitro*. *Potensi agen hayati dalam menghambat pertumbuhan Phytium sp. secara in vitro* / Octriana, L. (Balai Penelitian Tanaman Buah Tropika, Solok (Indonesia)). *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 138-142, 2 ill., 3 tables; 11 ref.

PYTHIUM; DURIO ZIBETHINUS; SEEDLINGS; GLIOCLADIUM; TRICHODERMA; ASPERGILLUS; PENICILLIUM; IN VITRO; FUNGI; MICROBIAL PESTICIDES; GROWTH; INHIBITION; BIOLOGICAL CONTROL AGENTS.

The study aimed at testing the potential of some antagonistic fungi isolated from durian seedlings media to inhibit growth of *Phytium* sp. Research was done at the Central Laboratory of Tropical Fruit Research Solok in July-September 2009 by using a completely randomized design with 5 treatments and 4 replications. Tests was conducted by dual culture method on PDA. The results showed that *Gliocladium* sp., *Trichoderma* sp.a, *Trichoderma* sp.b, *Aspergillus* sp., and *Penicillium* sp. could inhibit growth of *Phytium* sp., with growth inhibition of 50, 49.5, 47, 48, and 38.3%, respectively. Inhibition mechanism of *Gliocladium* sp. and *Trichoderma* sp. were competition, antibiosis, lysis, and parasitism, while *Penicillium* sp. was antibiosis. *Gliocladium* sp., *Trichoderma* sp.a, *Trichoderma* sp.b, *Aspergillus* sp., and *Penicillium* sp. could be used as biological agents to control pathogenic fungi *Phytium* sp.

105 RUSTAM

Selection and identification of antagonistic bacteria as biological control agents to rice sheath blight disease. *Seleksi dan identifikasi bakteri antagonis sebagai agens pengendali hayati penyakit hawar pelepah padi* / Rustam (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)); Wiyono, S.; Santosa, D.A.; Susanto, S. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 164-171, 1 ill., 3 tables; 24 ref.

ORYZA SATIVA; PLANT DISEASES; RHIZOCTONIA SOLANI; ANTAGONISTIC BACTERIA; BIOLOGICAL CONTROL AGENTS; IN VITRO EXPERIMENTATION; IN VIVO EXPERIMENTATION.

Selection and identification of effective microbes are important steps to obtain biological control agents. The objective of this research was to screen potential bacteria as controlling agents for rice sheath blight disease. The research was conducted at Plant Bacteriological Laboratory and greenhouse of Plant Protection Division of Bogor Agricultural University, Bogor, from May 2010 to February 2011. The trial was arranged in a completely randomized

design with bacterial isolates as treatment. The result showed that 30 out of 144 bacterial isolates indicated an antifungal activity to *R. solani. ln vivo* test indicated that 3 of the 30 isolates which have antifungal activity were able significantly to suppress the rice sheath blight disease. Those isolates were marked as TT47, SS19 and BR2, with the ability to suppress rice sheath blight disease at rate of 79.6, 56.4, and 49.4%, disease index 1.7, 3.7, and 4.3, and the disease incidence 33.3%, 73.35, and 80%, respectively. Molecular characterization of partial sequence of 16S rRNA on SS19, TT47, and BR2 isolates showed that those bacteria are *Serratia marcescens, Ralstonia pickettii,* and *Bacillus subtilis,* respectively.

106 SUMARTINI

Screening of some mungbean genotypes to powdery mildew disease. *Penyaringan ketahanan genotipe kacang hijau terhadap penyakit embun tepung* / Sumartini (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)) [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops] Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.) Bogor (Indonesia): Puslitbangtan, 2011: p. 436-452, 2 tables; 11 ref. Appendices. 633.31/.4/SEM/a

VIGNA RADIATA RADIATA; POWDERY MILDEWS; CORTICIUM ROLFSII; GENOTYPES; DISEASE RESISTANCE; GROWTH; CROP LOSSES; FLOWERING; SYMPTOMS; YIELD COMPONENTS; YIELDS.

A field research to study the resistant genotype to the powdery mildew disease was conducted at Jambegede Experimental Station in the dry season. There were 210 mungbean genotypes and five national varieties as a check were sown into rows. Each genotype consisted of 4 rows, 400 cm x 160 cm in square with 40 cm x 10 cm in distance. Yield component and disease intensity were observed. Disease intensity was observed by made a percentage value to the each genotype that covered by the disease. Resistant category were put from AVRDC with modification. The result of the research showed that out of 210 genotypes, 149 genotypes were resistant, 46 genotypes were moderately resistant, 10 genotypes were moderately susceptible, and 5 genotypes were susceptible. The genotypes that had as resistant as Vima-1 National varieties were MMC 295e-Gt-4, MMC 323-1d-Mn-1, MMC 323-1d-Mn-1, MMC 257-1e-Jg-2-Gt-1, MMC 261-12e-Jg-1-Bn-Gt-3.

H50 MISCELLANEOUS PLANT DISORDERS

107 IKHWANI

Responses of rice varieties to submergence, nutrient application, and plant spacing. *Respons varietas padi terhadap perendaman, pemupukan, dan jarak tanam* / Ikhwani; Makarim, A.K. (Pusat Penelitian dan Pengembangan Tanaman Pangan, Bogor (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 93-99, 5 ill., 5 tables; 9 ref.

ORYZA SATIVA; WATER TOLERANCE; NITROGEN FERTILIZERS; SPACING; GROWTH; YIELD COMPONENTS; YIELDS.

Combinations of fertilizer application and plant spacing on submergence tolerant rice varieties are expected to reduce yield losses and increase grain yields in the submerged

flood-prone wetland. The research were aimed at determining the effect of submergence on growth and yield of rice, finding out suitable technique of fertilizer application, and the best plant spacing in a flash flooding wetland. The research was conducted at farmer's field in Langgengsari Village, Belanakan District, Subang Regency, West Java, during the wet season of 2010. The treatments were arranged in a split-split plot design with three replications. Fertilizer application methods (Briquette urea 90 kg N/ha versus phonska + urea 90 kg N/ha) was the mainplot; planting methods [equal spacing (20 cm x 20 cm) and legowo 6:1 (20 cm-40 cm) x 10 cm)] as sub-plot, and submergence tolerant rice varieties (IR64 Sub-t, Swarna Sub-1 and Inpara 3) as sub-sub plot. The results showed that upon plant submergence for 14 days at the vegetative phase (14 to 28 DAP), the tolerant varieties still survived until harvest. During the 14-day submergence, plant height increased between 1.74 cm (Inpara 4) and 2.70 cm (lnpara 3), tiller number per hill increased between 0 (Inpara 3) and 3 (Inpara 5). Application of prilled urea + phonska three times during the plant growth resulted in higher yield (4.99 t dry grain/ha) significantly more than that applied with briquette urea twice (4.12 t dry grain/ha), indicating the importance of the third N application at primordial stage. The submergence tolerant rice varieties (lnpara 4 and Inpara 5) produced significantly higher yields (4.83 t and 4.80 t dry grain/ha, respectively) than Inpara 3 (4.04 t dry grain/ha) or Ciherang (3.90 t dry grain/ha) that were grown by farmers in the surrounding areas. The best plant spacing for rice in the flood prone lowland area varied with the rice varieties. Paired rows (jajar legowo) 6:1 planting method was more suitable for Inpara 5 (5.22 t dry grain/ha) than the squared spacing (tegel) 20 cm x 20 cm (4.38 t dry grain/ha). Meanwhile, the tegel spacing was better for Inpara 4 (5.29 t dry grain/ha) than the jajar legowo 6:1 (4.36 t dry grain/ha). The yield of Inpara 3 was not affected by plant spacing treatment.

J11 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCTS

108 DARNIADI, S.

Technology of red guava (*Psidium guajava* l.) juice powder using foam-mat drying method. ***Teknologi pembuatan bubuk sari jambu biji merah (Psidium guajava L.) dengan metode foam-mat drying*** / Darniadi, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 1-6, 6 tables; 26 ref.

GUAVAS; FRUIT JUICES; DEXTRINS; POWDERS; ECONOMIC VALUE; FOAM MAT DRYING; METHODS.

A research has been conducted with an objective to obtain red guava (*Psidium guajava* L.) juice powder with the best physical, chemical, and organoleptic quality using foam-mat drying method. The red guava juice powder is more practical in using and will increase its economic value. The experimental design used was randomized completely block design with two factors replicated three times, i.e. dextrin concentrations of 5%; 7.5%, and 10%, Tween 80 concentrations of 0.3%; 0.4%; and 0.5%. The results showed that the best treatment was obtained from the dextrin concentration of 10% and Tween 80 concentration of 0.5% with the yield 24.92%, dispersion in 21.27 seconds, the brightness/L * of 77.58, the level of redness/a * of 12.86, the level of yellowish/b of * 20.59, total sugar 53.78%, and preferred sensory properties.

109 JUMALI

Effect of packaging materials on quality of aromatic rice during storage. *Pengaruh bahan pengemas terhadap mutu beras padi aromatik selama penyimpanan* / Jumali; Indrasari, S.D.; Kusbiantoro, B. (Balai Besar Penelitian Tanaman Padi, Sukamandi, Subang (Indonesia)). Jurnal *Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 154-163, 10 tables; 20 ref.

RICE; PACKAGING MATERIALS; STORAGE; STORED PRODUCTS PESTS; QUALITY; ORGANOLEPTIC PROPERTIES; FLAVOUR; MOISTURE CONTENT; VOLATILE COMPOUNDS.

Research on the effect of packaging material for aromatic rice quality and its life storage was carried out. The aromatic rice varieties i.e Pandanwangi, Sintanur and Mentikwangi (each 750 kg) were dried in box dryer at 45°C for 12 hours. The dried paddy was milled at commercial milling to produce milled rice. The milled rice then were packed in high density polypropylene (HDPP), super bag and plastic sack. Factorial treatments were arranged in a completely randomized design, replicated thrice. The first factor was aromatic rice varieties (Sintanur, Mentikwangi and Pandanwangi) and the second factor was packaging material (superbag, high density polypropylene (HDPP) and plastic sack). Each treatment consisted of 5-7 kg of milled rice, kept in the room condition for six months. The physical, chemical characteristic, organoleptic test, and flavor composition were observed at the beginning, the middle and the end of storage. The result showed that physical quality of rice decreased parallel with the duration of storage. The whiteness, transparency and milling degree of rice kernel decreased as the period of storage increased. The infestation of insect in storage was found at 60 days after storing (at the second month) and tended to decrease parallel with insect life cycle. The used of plastic sack as packaging was invested by insect more than those of super bag and high density polypropylene. Therefore plastic sack was not recommended for packaging of aromatic rice at room condition. Organoleptic test indicated that cooked quality of aromatic rice decreased parallel with storing time. Based on colour, aroma, taste and texture, aromatic rice should be consumed within 90 days. After 90 days, the colour, aroma, taste and texture of the cooked rice was less preferred by panelis. The uses of plastic sack to pack aromatic rice produced cooked rice less preferable than those of super bag and high density polypropylene plastic.

L02 ANIMAL FEEDING

110 GUNTORO, S.

Organic waste based feed for bali cattle fattening. *Penggunaan ransum berbahan sampah organik untuk penggemukan sapi bali jantan* / Guntoro, S. (Balai Pengkajian Teknologi Pertanian Bali, Denpasar (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(2) p. 100-107, 5 tables; 17 ref.

BEEF CATTLE; FATTENING; RATIONS; ORGANIC WASTES; CHEMICAL COMPOSITION; FEED COMPOSITION; NUTRITIVE VALUE; BODY WEIGHT; ECONOMIC ANALYSIS.

Waste production in Denpasar City up to 2.200 m^3 per day, of which 70% (1,550 m^3) are organic matters. Of that able to fatten as many as 1,000 - 1,200 cattle. Research was done in order to using organic waste as a feed source on Balinese cattle fattening. The research was conducted on Temesi Village, Gianyar for four months. Waste fermented by *Trichoderma viride* for two weeks, then dried and milled to be flour form. As a feed, three part of organic

waste flour was mixed with two part concentrate and then called as a complete feed. The research was done to 18 Balinese bulls divided into three feed treatment groups, those were six bulls fed by 100% green feed *ad libitum* given (P0), six bulls fed by green feed and 1.5% complete feed measured from their each living body weight per day- *ad libitum* given (P1), and six others fed by 100% complete feed (meant 2.5-3.0% measured from their each living body per day) (P2). Parameters observed were bull growth and organic waste nutrition composition used proximate analysis. The result showed that fermentation with *Trichoderma viride* significantly could increase nutrition composition of feed, especially its extracted material without N and protein. P1 feed treatment increased each bull living body weight from 324 g/day (P0 feed treatment) to 508 g/day, or 36.22% increasing, and significantly different by statistic analysis. While, P2 feed treatment increased each bull living body weight until 601 g/day and significantly different from P0 and P1 feed treatments. Economically, the use of organic waste as feed material, could be concluded that fermented organic waste flour as much as 1.5% caould increase the living body weight and could increase the profits of farmers.

111 KWATRINA, R.T.

Feed plant availability and carrying capacity of *Rusa timorensis* deBlainville, 1822 at Dramaga Research Forest area. *Ketersediaan tumbuhan pakan dan daya dukung habitat Rusa timorensis deBlainville, 1822 di kawasan Hutan Penelitian Dramaga* / Kwatrina, R.T. (Balai Penelitian Kehutanan Aek Nauli, Parapat-Sumatera Utara (Indonesia)); Tekandjandji, M.; Bismark, M. *Buletin Plasma Nutfah* (Indonesia). ISSN 1410-4377 (2011) v. 17(2) p. 128-137, 2 ill., 3 tables; 22 ref.

CERVIDAE; FEED CROPS; PRODUCTIVITY; FEED CONSUMPTION; CARRYING CAPACITY.

The research was conducted to find out potentials feed plant availability and carrying capacity at Dramaga Research Forest area. Data was collected by measuring feed plant productivity of 45 plots with size 1 m x 1 m, and consumption level of four rusa deer (*Rusa timorensis* de Blainville, 1822). The result showed that the highest feed plant productivity was 17,362.09 kg/ha/year, and the lowest was 502.22 kg/ha/year. Light intensity correlation (y, lux) with dry weight production in 20 days (x, kg/ha) was y = 4.64 x -15.46 (r = 0.95). Feed plant availability was 121,607.01 kg/year, while consumption level based on fresh weight was 6.4 kg/individual/day or 2,336 kg/individual/year. Carrying capacity on observation area (11.9 ha) was 52 individual/year or 3.13 individual/ha/year.

L20 ANIMAL ECOLOGY

112 BUDIMAN, A.

Distribution and pattern of species abundance of mangrove molluscs. *Persebaran dan pola kepadatan moluska di hutan bakau* / Budiman, A. (Pusat Penelitian Biologi, Cibinong (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 403-409, 1 ill., 30 ref.

MOLLUSCA; MANGROVES; BIODIVERSITY; GEOGRAPHICAL DISTRIBUTION.

Mangrove molluscs data collected from some mangroves forests in Indonesia (Sumatra, Kalimantan, Java, Maluku, and Papua) are used in order to understand the mangrove molluscs distribution and pattern of species abundance. The results of the present study strongly suggest three models (or combination of them) of distribution, i.e. (1) molluscs (especially bivalve) are only found in certain microhabitat, in which they reach larger

densities; (2) certain species of mollusc may recruit widely, but suffer increase mortality in certain microhabitats; and (3) molluscs (especialy for mobile animals, such as many gastropods) may actively move among macrohabitats, increasing local densities in some of those. The correlation between features of habitat and abundance of molluscs which can be described as preference are discussed.

L73 ANIMAL DISEASES

113 ASTITI, L.G.S.

Evaluation on anthelmintik effectivity fo bali cows in Central Lombok (Indonesia). ***Uji efektivitas preparat anthelmintik pada sapi bali di Lombok Tengah*** / Astiti, L.G.S. Panjaitan, T.; Wirajaswadi, L. (Balai Pengkajian Teknologi Pertanian Nusa Tenggara Barat, Mataram (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(2) p. 77-83, 3 ill., 1 table; 28 ref.

COWS; ANIMAL DISEASES; HELMINTHS; PARASITES; ANTHELMINTICS; NUSA TENGGARA.

The efficacy evaluation of 3 anthelminthics was conducted at Jeliman Subvillage, Karang Sidemen Village, Batu Kliang Utara Subdistrict, Central Lombok District. The aim of the study was at finding out efficacy of the anthelmintic drug on bali cows. Fifteen bali cows aged 3-4 years were allocated randomly into 3 groups. The treatments were: administration of ivermectin 1% by subcutan injection (I), administration albendazole orally (A), and administration of piperazine citrate orally (P). The doses of anthelmintic were based on factory recommended doses. Body weight of the bali cows were estimated by body weight table. The results showed that 73.3% of bali cows was infected with gastrointestinal parasite. The percentage of *Ascaris* sp., *Bunostomum* sp., *Fischoederius* sp. and *Carmyerius* sp., *Mecistocirrus* sp. and *Cooperia* sp. were 63.6%; 54.5%; 27.3%, and 18.2% respectively. The family of gastrointestinal parasite was from Ascarididae, Ancylostomatidae, Paramphistomatidae and Trycostrongylidae. Efficacy of anthelmintic drug was different to all species. The efficacy of anthelmintic drug I and A group was better than P group.

114 SANI, Y.

Methanolic extract of mindi leaf (*Melia azedarach*) as a bioinsecticide for controlling *Chrysomya bezziana* infection in sheep. ***Ekstrak daun mindi (Melia azedarach) sebagai bioinsektisida untuk pengendalian infeksi Chrysomya bezziana pada domba*** / Sani, Y. (Balai Besar Penelitian Veteriner, Bogor (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 433-445, 7 ill., 7 tables; 20 ref.

SHEEP; MELIA AZEDARACH; PLANT EXTRACTS; BOTANICAL INSECTICIDES; DERMATITIS; CHRYSOMYA; PARASITES; MORTALITY.

Parasitic dermatitis may cause economic loss for livestock industry if it is not approriately controlled. Among the preventive measures available presently, the use of plant-derived insecticides is regarding as an alternative approach to control the disease since it is environmentally and animal health safe. The purpose of this study was to assess the effects of mindi (*Melia azedarach* Linn.) extract leaves for controling *Chrysomya bezziana in vitro* and *in vivo*. The study showed that the methanolic extract of *M. azedarach* leaves affected various stages of *C. bezziana* larvae. A topical application of 0.25% methanol extract in vaseline mixture killed and inhibited the growth of larvae and reduced weight gain of both L1 and L1 larvae. The average mortality rate in a treated group (26%) was higher than that in

a control group (19.2%). Greater reduction of average weight gain was also seen in the treated group (0.2719 g) compared to the control group (0.4761 g). The larvae apparently had smaller size and wrinkled shape of anatomical structure seeming that they were in appropriately grown. While the average mortality rate of L2 was found higher in the treated group (46.8%) than the control group (22.4%). The leaf-methanol extract had greater effect to L2 than L1 as seen higher mortality rate in L2 (46.8%) than the L1 (26%). In conclusion, the higher dose rate of methanol extract applied would lead to high mortality of the larvae. The low mortality rate might be due to low concentration (0.25%) of leaf extract applied and short period of time for bioassay. These findings seem very promising, suggesting that it might possible to increase larvicidal effects by increasing the concentration and time of assessment.

N01 AGRICULTURAL ENGINEERING

115 KOES-SULISTIADJI.

Development of mechanization model for rice production at PLG area to increase farm activity efficiency. *Pengembangan model mekanisasi budi daya padi di kawasan PLG untuk meningkatkan efisiensi usaha tani* / Koes-Sulistiadji (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)). *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(1) p. 59-70, 2 ill.; 12 ref. Appendices.

ORYZA SATIVA; CULTIVATION; MECHANIZATION; MODELS; PEATLANDS; FARM EQUIPMENT; FARMING SYSTEMS; PRODUCTIVITY; ECONOMIC ANALYSIS; KALIMANTAN.

A peat moss area in Central Kalimantan regarded as PLG is a national asset that needs to be rehabilitated and revitalized, since it has potential as 1.4 million hectares land resources. Almost of that land has not been exploited as sustain and productive land due to limited human resources and cultivation machineries. Therefore, it requires an application of agricultural machineries. Purpose of this research was to develop the models of paddy farm mechanization to increase the farming efficiency from manual to mechanical method through implementation of several farm machineries in the activities that use plenty labors such as prototype of a dry seedbed; manual transplanter; power weeder; mower; and thresher. Results showed that the use of agricultural machineries and equipments in area of rice cultivation has reduced the labor cost by Rp 2,035,378/ha compared to conventional farming system. The ratio of agricultural machinery and equipment performance to the manual method was 2-3 times, 15 times, 11 times, 10 times, 4 times, and 17 times, each for a unit of dry seedbed, hand tractors, manual transplanter, power weeder, mower, and thresher, respectively. While "coverage area" for each of these agricultural machinery and equipment in the dry season (MK) and the wet season (MH) was 8 ha (MK and MH); 21.8 ha (MK) and 20.9 ha (MH); 9.1 ha (MK) and 5.5 ha (MH); 29.8 ha (MK) and 9.5 ha (MH); 20.3 ha (MK) and 6.5 ha (MH); 45.1 ha (MK) and 14.4 ha (MH), respectively.

N20 AGRICULTURAL MACHINERY AND EQUIPMENT

116 AMAN, W.P.

Optimization of design to minimize construction cost of greenhouse effect-hybrid (GHE-Hybrid) corn dryer. *Optimasi rancangan untuk meminimumkan biaya konstruksi alat pengering efek rumah kaca-hibrid (ERK-Hibrid) untuk jagung* / Aman, W.P. (Universitas Negeri Papua, Manokwari (Indonesia)); Wulandari, D.; Astika, I W.; Nelwan,

L.O. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(1) p. 51-58, 4 ill., 1 table; 14 ref.

MAIZE; GREENHOUSES; DRYERS; CONTRUCTIONS; EQUIPMENT PARTS; DRYING; GREENHOUSE EFFECT; COSTS; PRODUCTION COSTS; PRODUCTIVITY; OPTIMIZATION METHODS.

A study on optimization of design to minimize construction cost of greenhouse effect-hybrid (GHE-hybrid) corn dryer has been conducted. The main objective of this study was to optimized the design in minimizing construction cost of GHE-hybrid corn dryer. In detail, the aim of the study was to evaluate performance of greenhouse effect-hybrid (GHE-hybrid) corn dryer, to simulate process of corn drying with GHE-hybrid dryer, and to estimate operating cost of GHE-hybrid corn dryer. Optimization method used in this study was Lagrange Multiplier method. The results of this study showed that drying 1526 kg corn with initial moisture content 25.7% wet basis until 16.7% wet basis required 14 hours. By using Lagrange Multiplier optimization method, optimum design of GHE-hybrid corn dryer could be obtained. Design of optimum components of GHE-hybrid obtained were 16.21 m^2 of drying housing area, 2117.86 W of power supply to run blower and 14.61 m^2 of heat exchanger area, with the minimum construction cost was Rp 19,596,587. Those optimum design was obtained from the drying process of 1526 kg corn for 14 hours, at average solar irradiation about 421.43 W/m^2. In conclusion, optimum design of GHE-hybrid was influenced by drying process condition where the GHE-hybrid corn dryer will be applied.

117 FATAH, G.S.A.

Prospects of motasi (mechanical plower, harrower, planter, and weeder) in light dry land of soybean farming system. ***Peluang penerapan mesin olah tanah, tanam dan siang (MOTASI) untuk mendukung budi daya tanaman kedelai di lahan kering tanah ringan*** / Fatah, G.S.A.; Sudaryono; Prasetiaswati, N. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.) . Bogor (Indonesia): Puslitbangtan, 2011: p. 363-375, 4 ill., 1 table; 14 ref. 633.31/.4/SEM/a

GLYCINE MAX; TILLAGE EQUIPMENT; WEED CONTROL EQUIPMENT; SOWING EQUIPMENT; EQUIPMENT TESTING; EQUIPMENT PERFORMANCE; FARMING SYSTEMS; ECONOMIC ANALYSIS.

Inadequate and expensive of labor expenses in soybean cultivation is a problem on supporting the government to achieve soybean self-sufficiency program in 2014. An attempt to accomplish the program, the application of an appropriate mechanical technology is essential, such as the introducing appropriate agriculture tools and machinery which are applicable for farmers and farmer groups. One of the mechanical technology input to support the soybean cultivation in the dry-light-texture land is a machine for plowing, harrowing, planting and weeding (MOTASI). The weeding tool has been engineered in 2007, planting in 2008 and, plowing and harrowing in 2009, gradually. Furthermore the engine was designed due to the operation and maintenance easily. MOTASI consists of three main components namely: motor engine (5.5 HP), transmission (4 HP) and components (plower, harrower, planter and weeder). The weight of machine equipped with components ranges from 75 to 90 kg. Performance test was conducted at Muneng Experimental Station. Results showed that the machine operated well with a capacity of plowing, harrowing, planting and weeding was

23.7 hours/ha, 7.9 hours/ha, 12.3 hours/ha and 11.1 hours/ha, respectively. Based on financial analysis, the operation cost of MOTASI was about Rp 386,000/ha with break even point of 14.2 ha/year, B/C ratio of 1.4 at a price level of Rp 12,450,000/unit and operation cost of Rp 700.000/ha. The conclusion, MOTASI technically and economically prospected to be applied in light dry land on soybean farming system.

118 MANULU, L.P.

Drying characteristics of zedoary herb. *Karakteristik pengeringan lapisan tipis temu putih* / Manalu, L.P. (Badan Pengkajian dan Penerapan Teknologi, Jakarta (Indonesia)); Tambunan, A.H.; Nelwan, L.O.; Hoetman, A.R.. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(2) p. 75-84, 14 ill., 5 tables; 37 ref.

CURCUMA ZEDOARIA; DRYERS; DRYING; MATHEMATICAL MODELS; TEMPERATURE; MOISTURE CONTENT; POSTHARVEST EQUIPMENT.

In this study, the influence of drying air temperature and drying air relative humidity on the thin layer drying of zedoary or temu putih (*Curcuma zedoaria* Rosc.) slices was investigated. A laboratory air dryer was designed and used for drying experiments. The system was operated in an air temperature range of 40-60°C and relative humidity range of 20-80%. Four mathematical models available in the literature were fitted to the experimental data. The performance of these models was evaluated by comparing the modeling efficiency (EF), least root mean square error (RSME) and the least reduced x-square (X^2) between the observed and predicted moisture ratio. By statistical comparison of the values for the four models, it was concluded that the Page model represents drying characteristics was better than the other equations for describing single layer drying of temu putih. The effect of the drying air temperature on the drying model constants and coefficients were determined. The value of drying constant k and n of Page model varied within the ranges of 0.0010 to 0.0199/min and 1.1053 to 1.2783, respectively, while the value of EF, X^2 and RMSE of the model varied between 0.9731 and 0.99787, between 0.00156 and 0.001286, and between 0.001047 and 0.003482, respectively.

119 MARDISON S.

Nondestructive determination of chemical composition of *Jatropha curcas* L. by using NIR method and artificial neural network. *Penentuan komposisi kimia biji jarak pagar secara nondestruktif dengan metode near infra red (NIR) dan jaringan saraf tiruan (JST)* / Mardison, S. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong, Tangerang (Indonesia)); Budiastra, I W.; Tambunan, A.H. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(2) p. 85-94, 12 ill., 1 tables; 14 ref.

JATROPHA CURCAS; CHEMICAL COMPOSITION; ANALYTICAL METHODS; NONDESTRUCTIVE TESTING; NEURAL NETWORKS; EQUIPMENT; INFRARED SPECTROPHOTOMETRY; METHODS; LIPID CONTENT; CHEMICOPHYSICAL PROPERTIES; MOISTURE CONTENT.

The objective of this research was to determine chemical composition of *Jatropha curcas* L. nondestructively by using NIR method and artificial neural network. In this research, NIR spectroscopy was assessed to determine chemical composition of fat content, free fatty acid (FFA) and moisture content of *Jatropha curcas* L. The nondestructive method was based on optical reflectance within NIR wavelength 1000-2500 nm. Principle component analysis-back propagation neural network (PCA-BPNN) was established, based on PCA-BPNN adjusting the number of input nodes (principle component). The best model is obtained for

20 node input and 10 hidden layer with a coefficient of corellation (r) of 0.848, 0.872 and 0.993 with a root mean square error of prediction (RMSEP) 3.718%, 1.314% and 1.989% for fat content, FFA and moisture content, respectively.

120 NASUTION, D.A.

Performance testing of banana processing flour machineries. *Kinerja alat dan mesin pengolahan pisang menjadi tepung* / Nasution, D.A.; Rasmarestia W., E. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)). *Jurnal Enjiniring Pertanian* (Indonesia) ISSN 1693-2900 (2010) v. 8(1) p. 1-10, 5 ill., 6 tables; 10 ref.

BANANAS; FLOURS; PROCESSING; CHOPPERS; MILLING; DRYERS; EQUIPMENT PERFORMANCE; EQUIPMENT PARTS; EQUIPMENT TESTING; PRODUCTIVITY; ECONOMIC ANALYSIS.

Processing of bananas into flour aims not only for preservation but also for wheat flour substitution or functional food ingredients. At small scale production, banana flour processing have been made simply by using sun-drying and less hygienic equipments, therefore the production capacity was small and low quality flour. This activity developed mechanization technologies for processing bananas into flour on a farmer group scale to improve processing quality and production capacity. The processing unit consisted of a horizontal rotating disc type of slicer, a tunnel dryer and a disc mill. Performance tests had been conducted to determine the capacity of each machine and the quality results. Performance test of the slicer driven with pedal revealed an average capacity of 107 kg/hr, with the efficiency of 2-3 mm of slice thickness was 81.8%. Test of tunnel dryer with the loading capacity approximately 40 kg of slices resulted in seven hours of drying time to decrease the initial water content of 67.8% (w.b) into 10.8% (w.b). The disc mill performance test was conducted at the speed of the disk 7000 RPM, yielding an average capacity of flour 44.98 kg/hr with the percentage of particle size of flour more than 80 mesh was 97%. Flour whiteness test yielded 84.8%, whiter than banana flour produced by sun-drying with the whiteness degree of 71.4%. Simple financial analysis showed that the value of R/C ratio was 1.39 and the payback period of machines investment cost was about two years.

121 PRASTOWO, B.

Performance test of plant oil pressurized cooking stoves (Protos). *Uji kinerja kompor minyak nabati tipe tekan (Protos)* / Prastowo, B. (Pusat Penelitian dan Pengembangan Perkebunan, Bogor (Indonesia)); Sri-Mulato; Hastomo, A.D.; Rasmarestia W., E. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(1) p. 21-26, 4 ill., 2 tables; 10 ref.

JATROPHA; STOVES; BIOFUELS; COOKING; PRESSES; EQUIPMENT PERFORMANCE; EQUIPMENT PARTS; EQUIPMENT TESTING; PRODUCTIVITY; ECONOMIC ANALYSIS.

Plenty kinds of stoves using alternative materials such as plant oils energy sources have grown since the cost of petroleum fuel is increasing significantly. One of them is plant oil pressurized cooking stove (Protos). Performance test of a 2.5 kW plant oil pressurized stove has been conducted. The stove was fueled with crude *Jatropha curcas* oil (CJO) and crude palm oil (CPO). The performance parameters studied were thermal efficiency, oil consumption and specific oil residue. The average thermal efficiency of the stove fueled with CJO and CPO were 45.5% and 49.7%, respectively. The thermal efficiency of the plant oil

stove is higher than that of kerosene wick stove (38%), but it is still lower than LPG stove (55%). Average crude jatropha oil consumption was 223 g/h and crude palm oil was 249 g/h. The specific oil residue of CJO in vaporizer was varied from 7.5 to 9.9 mg/g oil, while the residue of CPO was 8.6-11.5 mg/g oil.

122 RATNANINGSIH

Design and manufacturing of cylinder type sago sieving machine. ***Rekayasa alat pemarut sagu tipe silinder*** / Ratnaningsih; Setyawan, N.; Dewandari, T.; Sumangat, D. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(2) p. 67-74, 6 ill., 2 tables; 10 ref.

SAGO; STARCH PRODUCTS; SIEVING; DESIGN; POSTHARVEST EQUIPMENT; PROTOTYPES; EQUIPMENT PERFORMANCE; PROCESSING LOSSES.

Sago sieving machine uses cylinder type of sieve, which consists of six main parts: the main frame, engine, transmission system, chopper, unloading and sieve cylinder. Sieve machine uses energy sources in the form of three-phase electric motor, 4.25 kW, 380 volt; with a belt and pulley transmission system. Sago sieve machine that use cylinder type sieve has an effective capacity of 268.43 kg/hour/person, grated yield losses of 4.2% with an efficiency of 95.78%. The yield of the produced sago starch was 16.3% based on the weight of beginning initial pith and based on the weight of pith after sieving process was 17.07%.

123 SUPARLAN

Technical and economical evaluation of the application of Jatropha seeds expeller to fulfil rural scale requirement. ***Evaluasi aspek teknis dan finansial penerapan mesin pengepres biji jarak untuk memenuhi kebutuhan bahan bakar skala pedesaan*** / Suparman; Rasmarestia W., E.; Hasanah, A.N. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)). *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(1) p. 11-20, 4 ill., 2 tables; 11 ref. Appendix.

JATROPHA; BIOFUELS; PROCESSING; PRESSES; EQUIPMENT PERFORMANCE; EQUIPMENT PARTS; EQUIPMENT TESTING; PRODUCTIVITY; ECONOMIC ANALYSIS.

Jatropha curcas oil is one of the oils seed that are developed for fossil oils substitution. The technology for jatropha oil processing is available. However, the current status of technology is still in developing process. Therefore, feasibility study of both technical and economical aspects is need to be conducted. This study was done to support the program of the village self sufficiency production of energy (Desa Mandiri Energi, DME). The purpose of this research was to conduct a feasibility study of both technical and economical aspects of the application a double stage screw expeller developed by ICAERD, comparing with single stage screw expeller developed by ITOFCRI. The test revealed that the capacity of single stage was higher (80 kg/h) than that of the double stage (65 kg/h). However, the double stage screw press had higher efficiency of extracted oil (68.1%) than the single stage screw press (64.3%). Financial analysis showed that if the price of raw material of seed was Rp 1,000/kg, then the minimum price of selling the oil was Rp 5,000/liter for B/C ratio 1.13. If the price of seed was Rp 1, 500/kg, then the minimum price of oil was Rp 6,500 for B/C ratio 1.12. One unit of jatropha double stage screw type expeller could be used to process jatropha seed yielded from 31 ha of jathropha plants at productivity of 4.36 t/ha/yr.

124 TAHIR, M.

Design of the air flow rate and feeder system of biomass fuel controller fuzzy based for hybrid greenhouse effect dryer. *Desain kendali laju aliran udara dan sistem pengumpan bahan-bakar biomassa berbasis fuzzy pada pengering ERK-hybrid* / Tahir, M. (Universitas Negeri Gorontalo (Indonesia). Fakultas Pertanian); Subrata, I D.M.; Purwanto, Y.A. *Jurnal Enjiniring Pertanian* (Indonesia) ISSN 1693-2900 (2010) v. 8(2) p. 95-104, 10 ill., 1 table; 10 ref.

MAIZE; POSTHARVEST EQUIPMENT; DESIGN; BIOFUELS; AIR FLOW; GREENHOUSE EFFECT; DRYERS; PROTOTYPES; TEMPERATURE.

Drying process involves both heat (energy) and mass transfer in the continue operations simultaneously. The optimum condition of air that obtained in this drying could be gained through controlling method, where one of them is fuzzy logic controller (FLC). The objective of this research was to examine the performance of the control system with FLC in drying activity of corn on hybrid-greenhouse effect dryer FLC has been arranged on four inputs namely temperature error, RH error and their error change. The process of fuzzy yielded two outputs and used to control the air flow rate and feeder system of biomass fuel in the dryer. Devices such as biomass stove, AC motor driver, DC motor driver feeding for mechanism and microcontroller base measurement system have been designed under this research. The testing of the FLC on Hybrid-Greenhouse Effect dryer with 1526 kg of corn yielded average drying air of 46.8°C with deviation of 3.6°C to the desired temperature. The average relative humidity of 41.8% provided deviation of 6.1% to the desired RH and both parameter needed 10 minutes rising time to each desired value (47°C and 45% RH). The fuzzy controlling yielded air flow rate of 1.25 m/sec and rotation speed of feeder 0.95 RPM. Biomass energy had the greater portion, 85.2% of the total energy consumption and 12.3 kg/hour rate of feeding. Solar and electrical energy consumption had portion of 9.6% and 5.2%, respectively. The specific energy consumption (SEC) of this drying was 13.7 MJ/kg with drying efficiency 2.87%. The air drying condition which resulted by fuzzy controlling could increase the drying rate of 1.30% db/hour as indicator of the drying effectiveness.

125 WARJI

Design and manufacturing hammer mill. of cassava. *Rancang bangun mesin penepung ubi kayu tipe hammer mill.* / Warji; Kuncoro, S.; Asmara, S. (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian); Rahmawati, H. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(2) p. 59-66, 3 ill., 4 tables; 13 ref.

CASSAVA; TAPIOCA; MILLING; DESIGN; POSTHARVEST EQUIPMENT; PROTOTYPES; EQUIPMENT PERFORMANCE; EQUIPMENT CHARACTERISTICS; FLOWERS; PROCESSING.

Cassava is a very important food crop that is capable of providing food security. An increase in production of cassava to sustain the national food security needs improved processing machinery. The objective of this research was to develop cassava milling machine, which able produce cassava flour as material source of cassava rice. The method consisted of material properties identification and determination of design parameter, design, manufacturing and testing. The hammer mill has been designed and constructed for producing basic and composite flours used in making cassava rice. The hammer mill produced particles in the coarse, medium and fine categories with proportion of 71.44%, 19.57%, and 8.28%, respectively. The milling process based on moving and hammer stroke in the milling chamber. The result showed that the hammer mill machine has good work in producing cassava flour used in making cassava rice. The hammer mill work capacity was

286 kg/hour on 1657 rpm of main shaft speed, source from 2 HP (1.3 kw) electrical motor, the effectivity was 98.98%, and the efficiency was 91.20%.

126 WIDYOTOMO, S.
Performance evaluation of a horizontal cylinder type wet coffee pulping machine. ***Evaluasi kinerja mesin pengupas kulit buah kopi basah tipe silinder horisontal*** / Widyotomo, S. (Pusat Penelitian Kopi dan Kakao, Jember (Indonesia). *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(1) p. 27-38, 10 ill., 1 table; 19 ref.

COFFEE BEANS; PULPING; PEELING; EQUIPMENT PARTS; EQUIPMENT PERFORMANCE; EQUIPMENT TESTING; PRODUCTIVITY; QUALITY.

Pulping is one of important steps in wet coffee processing method. Usually, pulping process uses a machine which constructed by wood or metal materials. A horizontal single cylinder type of fresh coffee cherries pulping machine is the most popular machine in coffee processor and market. One of the weaknesses of fresh coffee cherries pulping machine is it produces highest broken beans. Broken bean is one of major aspects in defect system that result in low quality. Indonesian Coffee and Cocoa Research Institute has designed and evaluated a horizontal single-double-and triple cylinder type of fresh coffee cherries pulping machine. Material tested was arabica coffee cherries, mature, 60-65% (wet basis) moisture content, size composition of coffee cherries was 50.8% more than 15 mm diameter, 32% more than 10 mm diameter, and 16.6% to get through 10 mm hole diameter; 690-695 kg/m3 bulk density, and clean from metal and foreign materials. The result showed that the work capacity was 973-1890 kg/h for single cylinder, 2420-3030 kg/h for double cylinders and 6530-7600 kg/h for triple cylinders type wet coffee pulping machine. For single cylinder type, work capacity was 1,890 kg/h in 308 rpm cylinder rotation speed with 1% broken beans, 9.2% whole parchment beans, 20% dried skin mixed with the beans, and 4.1% unpulped cherries. For double cylinder type, work capacity was 3,000 kg/h in 570 rpm cylinder rotation speed with 5.4% whole parchment beans, 15% dried skin mixed with the beans, and 3% unpulped cherries. For triple cylinder type, work capacity was 7,600 kg/h in 525 rpm cylinder rotation speed with 3.6% whole parchment beans, 6.7% dried skin mixed with the beans, and 1.8% unpulped cherries.

P33 SOIL CHEMISTRY AND PHYSICS

127 FAHMI, A.
Dynamics of surface adsorption of Fe oxide humic substance complexes. ***Dinamika jerapan permukaan kompleks Fe oksida-senyawa humat*** / Fahmi, A. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru (Indonesia)). *Jurnal Sumberdaya Lahan* (Indonesia). ISSN 1907-0799 (2011) v. 5(2) p. 75-82, 5 ill., 22 ref.

IRON; OXIDES; ADSORPTION; HUMUS; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES.

Iron (Fe) oxide is the most abundant metallic oxides in the soils. It is highly reactive so that it has a huge influence on the dynamics of chemical balance in the soil, both in terms of soil fertility and environmental decontamination from toxic metal. Naturally, the surface of Fe oxide is coated with organic substances in the form of complexes compound. This condition may influence on its reactivity and retention capacity to ions in the soil solution. The presence of humic substances may increase or decrease the adsorption capacity of Fe oxide in which the complexes adsorption capacity is highly dependent on some environmental

factors. Complexes formation of Fe oxide - humic substances increase cation adsorption esspecially in very acid condition. Ionic strength tends to influence only on basic pH condition and the increasing of ionic strength increased complexes adsorption. Adsoption processes is also influenced by concentration, molecule weight and type of adsorbent and adsorbate material. The presence of competition between ions and blocking process by organic substances on adsorption process decreases a number of sorbed ion.

128 NURSYAMSI, D.

Mechanisms of releasing fixed potassium as available nutrient for plant growth on smectitic soils. ***Mekanisme pelepasan K terfiksasi menjadi tersedia bagi peretumbuhan tanaman pada tanah-tanah yang didominasi smektit*** / Nursyamsi, D. (Balai Penelitian Lingkungan Pertanian, Pati (Indonesia)). *Jurnal Sumberdaya Lahan* (Indonesia). ISSN 1907-0799 (2011) v. 5(2) p. 61-74, 10 ill., 3 tables; 24 ref.

CLAY MINERALS; POTASSIUM; NUTRIENT AVAILABILITY; SMECTITES; POTASSIUM; SOIL CHEMICOPHYSICAL PROPERTIES.

Smectitic soils have considerable prospects to be developed into agricultural land. The distribution of these soils is quite large, i.e. more than 2.12 million ha (approximately 2:12 million ha of Vertisols as well as Alfisols and Inceptisols which have vertic subgroup). Smectite mineral contributed significantly to the amount of soil negative charge and controled soil buffering capacity and soil K maximum sorption. Top soil (0-20 cm) of smectitic soils are generally clay-textured, neutral to alkaline in soil reaction, moderate to high in potential K, low to high in exchangeable K, and moderate to high in cation exchange capacity. Although soil total K was high, but most of the soil K was in an unexchangeable form; so that it was not immediately available for plants. While soil buffering capacity and maximum sorption on K were high. One important aspect in the management of soil K is the use of K contained in the soil. This method is quite effective, particularly for smectitic soils. The use of contained K in soil can be through the mechanism of release from unexchangeable soil K pool to exchangeable soil K pool as well as desorption from exchangeable soil K pool to soluble soil K pool. After both reaction take place, then, the plants will easily absorb Kfor their growth.

P34 SOIL BIOLOGY

129 MAFTU'AH, E.

Earthworms community on several land uses of peat land in Central Kalimantan [Indonesia]. ***Komunitas cacing tanah pada beberapa penggunaan lahan gambut di Kalimantan Tengah*** / Maftu'ah, E.; Susanti, M.A. (Balai Penelitian Pertanian Lahan Rawa, Banjarbaru (Indonesia)). *Berita Biologi* (Indonesia). ISSN 0126-1754 (2009) v. 9(4) p. 371-378, 3 ill., 2 tables; 14 ref.

OLIGOCHAETA; ANIMAL MORPHOLOGY; LAND USE; PEATLANDS; POPULATION DYNAMICS; KALIMANTAN.

Peat land has specific character, depends on depth of peat and peat decomposition rate. Earthworms has a role in decomposition, carbon cycle, nutrient redistribution, bioturbation and nutrient cycle. The aims of the research were at identifying the population and diversity of earthworms on peat soil in Central Kalimantan and at obtaining species of dominant earthworm in peat land. The research was carried out in several peat land are in Basarang and Kalampangan, Central Kalimantan within dry and rainy season. The collection of

earthworms was by using hand sorting method. The result showed that population of earthworms on mulch was higher than that of the deep peat. Land are influenced highest population and diversity of earthworm. The highest population and diversity of earthworms were on pineapple plantation (shallow peat soil). The dominant species of earthworm in peat land was *Pontoscolex corethurus*.

130 PRIHASTUTI

[Effect of residues of biological agent use on soybean and groundnut yields on Ultisols, Central Lampung (Indonesia)]. ***Pengaruh residu penggunaan agensia hayati terhadap hasil kedelai dan kacang tanah pada lahan Ultisols, Lampung Tengah*** / Prihastuti; Sudaryono (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 213-218, 2 ill., 3 tables; 12 ref. 633.31/.4/SEM/a

GLYCINE MAX; ARACHIS HYPOGAEA; BIOLOGICAL CONTROL AGENTS; SOIL BIOLOGY; SOIL MICROORGANISMS; RESIDUES; GROWTH; YIELDS; ACRISOLS.

The bio-agent introducing is a microbial-soil investment and plant growth improvement. The application of bio-agent at Ultisols in Central Lampung produced 1.50-1.65 t/ha seed yield of soybean or lower around 10.8-29.9% from inoculation lasted. The groundnut production at this land was around 1.9-2.6 t/ha yield. Compared the control, the bio-agent application still gave higher yield. It indicated that bioagent activities has not yet optimal. The result suggested that the application of bio-agent residue shall only be done if the microbial population had not fulfilled by soil biology standard, with still look after maintenance of microbe growth environment.

131 WIHARDJAKA, A.

Nitrous oxida emission from dry direct seeded rice due to application of rice straw and nitritification inhibitor materials. ***Emisi gas dinitrogen oksida pada pertanaman padi gogorancah akibat pemberian jerami padi dan bahan penghambat nitrifikasi*** / Wihardjaka, A. (Balai Penelitian Lingkungan Pertanian, Pati (Indonesia)); Tandjung, S.D.; Sunarminto, B.H.; Sugiharto, E. *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2010) v. 29(3) p. 144-151, 4 ill., 2 tables; 21 ref.

ORYZA SATIVA; POLLUTANTS; NITROUS OXIDE; DENITRIFICATION; RICE STRAW; NITRIFICATION INHIBITORS; AZADIRACHTA INDICA; GROWTH; FLOODED RICE.

Alternate of wet-dry soil conditions under rainfed lowland had influenced the source and sink dynamics of Greenhouse Gas production. Lowland rice soil is considered a source of nitrous oxide (N_2O) emission, produced through nitrification and denitrification processes by microbes. Incorporation of rice straw into soil and application of nitrification inhibitors are expected to sustain soil productivity and to increase N fertilizer efficiency for rice under rainfed lowland. A field experiment was conducted in a rainfed lowland rice during the 2009/2010 rainy season, to identify the effect of interaction between rice straw and nitrification inhibitors application, on N_2O emission from a direct seeded rice cropping. The experiment was arranged in a factorial randomized block design with three replications. The

treatments were rice straw applications (without rice straw, fresh straw, composted straw) and inhibitor nitrification materials (without inhibitor nitrification, neem leaves cake, carbofuran compound). N_20 emission under direct seeded rice crop ranged from 124-485 g N_2O/ha/season. The lowest N_2O emission was found in plots treated with fresh rice straw combined with neem leaves cake (124 ± 6 g N_2O/ha/season), while the highest N_2O emission (485 ± 14 g N_2O/ha/season) was found in the control plots. Treatments with fresh straw or composted straw reduced N_2O flux in the direct seeded rice crop by 33% and 28%, respectively. Applications of neem leaves cake and carbofuran pesticides suppressed N_2O emission by 30 to 57% and 12 to 48%, respectively. Rice straw incorporation into rainfed lowland soils could reduce nitrous oxide emission. Neem leaves cake has a prospect as a nitrification inhibitor material cheaper, easier, and more effective in decreasing N_2O emission from rained lowland soils.

P35 SOIL FERTILITY

132 MANSHURI, A.G.
[Diagnosis of nutrient status and NPK fertilizer application of soybean in lowland rice field]. Diagnosis status hara dan pemupukan NPK tanaman kedelai di lahan sawah / Manshuri, A.G. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 160-173, 5 ill., 10 tables; 20 ref. 633.31/.4/SEM/a

GLYCINE MAX; NUTRIENT AVAILABILITY; NPK FERTILIZERS; DOSAGE; SOIL FERTILITY; NUTRITIONAL REQUIREMENTS; YIELDS; IRRIGATED LAND.

In irrigated lowland, soybean is planted after rice. The soil status of N, P and K of irrigated lowland is low, unbalance and has a great variability among locations. Improving the previous general recommendation, it needs a new approach of N, P and K fertilizer application based on the plant requirement and indigenous of N, P and K supply of a soil. Principally, fertilizing is giving nutrients as much as plants needs with respect to those of kinds or quantity. Part of nutrients is obtained from the soil and the other is received from fertilizer. Diagnose of nutrient in the soil is important in establishing fertilizing recommendation. The result of soil test with double pot technique shown that N availability in Vertisols was low (SQ: 0.66 to 0.76), P was high (SQ: 0.91 to 1.00) and K was low (SQ: 0.8 to 0.76). In Entisols, N availability was low (SQ: 0.64 to 0.74), P was varied from low to high (SQ: 0.49 to 0.90). Based on soil analysis, Franzen (1999) reported that the dose of P followed (1.55-0.1 x P-Bray x yield target) or (1.55-0.14 x P-Olsen) x yield target, and the K recommendation was (2.2-0,0183 x K-Bray) x yield target. The information about kinds and amount of nutrients which required by plants had to be known before applying the new approach of fertilizing. Fertilizing with omission plot needed the information of total N, P and K absorption in relation to yield target, agronomic efficiency of N, P and K, and indigenous supply of N, P and K. There were a great variability of indigenous nutrient supply of N, P and K among locations from 58 kg N/ha to 167 kg N/ha, 5 kg P/ha to 24 kg P/ha, and 8 kg K/ha to 119 kg K/ha, respectively. The agronomic efficiency of NPK values were 0 - 22 kg seeds/kg N, 0 - 22 kg seeds/kg P and 3 - 20 kg seeds/kg K, respectively. The optimal N, P and K absorption followed linear functional relationships, those were YNop = 14.20 X, YPop = 133.47 X and YKop = 23.22 X. Based on the information, the application

of N, P and K had been established, appropriate to the indigenous N, P and K supply and yield target.

P36 SOIL EROSION, CONSERVATION AND RECLAMATION

133 AQIL, M.

Analysis of topographic and land use relationship on erosion occurence. ***Analisis hubungan faktor topografi dan penggunaan lahan terhadap tingkat erosi*** / Aqil, M.; Andayani, N. (Balai Penelitian Tanaman Serealia, Maros (Indonesia)). *Informatika Pertanian* (Indonesia). ISSN 0852-1743 (2011) v. 20(1) p. 41-45, 3 ill., 3 tables; 10 ref.

EROSION; GEOGRAPHICAL INFORMATION SYSTEMS; LAND USE; CARTOGRAPHY; TOPOGRAPHY; RIVERS; WATERSHEDS MANAGEMENT; JAVA.

Soil erosion is a major environmental problem in Indonesia. Topographic and land use system are considered as the important factor affecting soil erosion. This study addresses a methodology for identifying the relationship of topographic and land use type on erosion occurrence. The research was conducted in Indonesia from 2008 to 2009. The RUSLE model was applied to the Bengawan Solo watershed using GIS. The watershed was divided into 100 m x 100 m grid cells, and the calculation was performed using ArcGIS software. The results of calculation indicated that the area covered by High, Severe, and Very Severe erosion potential zones in this watershed were 18.87%, 15.86%, and 5.97% of the total area, respectively. More than 40% of the watershed area showed average annual soil loss >60 t/ha/yr. Topographic and land use are considered as the major factors that contribute to the high sediment transfer from upland areas. Spatial analysis showed that upland field activity on the moderate-steep slope contributed significantly to the soil erosion. Thus, these areas need immediate attention for soil and water conservation activities to prevent further land degradation and its depleting productivity. Land conservation map has been created to localize land use features as well as recommended conservation measures which should be applied in order to limit further land degradation.

134 SUBOWO G.

Open system environment-friendly mining and post-mining reclamation efforts to improve the quality of land resources and soil biodiversity. ***Penambangan sistem terbuka ramah lingkungan dan upaya reklamasi pasca tambang untuk memperbaiki kualitas sumber daya lahan dan hayati tanah*** / Subowo G. (Balai Penelitian Tanah, Bogor (Indonesia)). *Jurnal Sumberdaya Lahan* (Indonesia). ISSN 1907-0799 (2011) v. 5(2) p. 83-94, 4 tables; 23 ref.

LAND RESOURCES; WASTE LAND; RECLAMATION; SOIL CONSERVATION; SOIL CHEMICOPHYSICAL PROPERTIES; SOIL BIOLOGY.

Conventional open pit mining systems largely changing the landscape and soil surface ecosystem balance, reducing soil productivity and environmental quality. On the other hand, good mining activities can increase national income, reduce pollution, decrease land slope, improve the thickness of topsoil, decrease soil density, increase infiltration-percolation and reduce soil erosion. Good implementation control of the open pit mining with the preservation of land resources and soil biodiversity can be achieved by: (1) mining blocks done from the bottom area, (2) reclamation carried out directly after the completion of mining, (3) formation of land surface with a wide terrace bench > 5 m, vertical-interval bench terraces < 2 m, the percentage of slope ± 60%, (4) removed topsoil was placed back

on the top layer with a thickness > 20 cm and enriched with lime, organic matter, fertilizer or biofertilizer (5) biorehabilitation with endogeic earthworms and planting of legume cover crops as pioneer plants to accelerate the natural succession, and (6) maintenance up to a climax ecosystem as expected.

Q02 FOOD PROCESSING AND PRESERVATION

135 INDRASARI, S.D.

Effect of rice milling and rice cooking to the vitamin B content. *Pengaruh penyosohan gabah dan pemasakan terhadap kandungan vitamin B beras merah* / Indrasari, S.D. (Balai Besar Penelitian Tanaman Padi, Sukamandi, Subang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2011) v. 30(3) p. 182-188, 4 tables; 30 ref.

RICE; VARIETIES; POSTHARVEST TECHNOLOGY; HUSKING; COOKING; VITAMIN CONTENT; THIAMIN; RIBOFLAVIN; PYRIDOXINE.

The number of improved red rice varieties (red color caryopsis) is still limited, namely Bahbutong and Aek Sibundong. Red rice is useful as functional food due to its antocyanin content which have a potential function as antioxidant. The research was aimed at studying the effect of processing (milling and cooking) on the thiamin (vitamin B1), riboflavin (vitamin B2), cianin (vitamin B3), and pyridoxin (vitamin B6) content of new varieties, local red varieties and advanced lines of red rice. The materials used in the experiment were two red rice advanced lines, local red rice (Jembar Beureum and Jatiluwih), red rice improved variety Aek Sibundong, and white rice variety Ciherang. Results showed that milling and cooking processes reduce thiamin, riboflavin, niacin, and pyridoxin contents on advanced improved red lines, red improved variety, local red varieties and Ciherang white improved variety. Jembar Beureum milled and cooked rice had the highest thiamin and niacin content. Jatiluwih milled and cooked rice had the highest riboflavin and pyridoxin content. Local red rice had higher vitamin B content than improved red advanced lines, Aek Sibundong and Ciherang white rice. Local red rice varieties may be used as parent material on the breeding program to develop red rice improved varieties with higher vitamin B content.

136 MISNAWATI

Analysis of pyrazine and volatile compounds in cocoa beans using solid phase microextraction. *Analisis pirazin dan senyawa volatil pada biji kakao menggunakan mikroekstraksi fase padat* / Misnawati; Sari, A.B.T.(Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(1) p. 24-35, 7 ill., 2 tables; 24 ref.

THEOBROMA CACAO; COCOA BEANS; FLAVOUR; PYRAZINES; VOLATILE COMPOUNDS; EXTRACTION; GAS CHROMATOGRAPHY; MAILLARD REACTION.

Analysis of pyrazine and volatile compounds in cocoa beans was done by using solid phase microextraction (SPME), to develop efficient non solvent extraction method. Extraction was carried out in head space technique using stableflex fiber coated with DVB/Carboxen/PDMS applied on manual sampling SPME Holder. Five grams of roasted fermented cocoa bean was processed into butter and placed into 30 ml vial and capped with a rubber septum, then heated at temperature of 70°C for 30 min. for the extraction. The fiber then was placed in GC header for desorption and separation. Results of the study showed that the SPME extracted pyrazines were adequate and well detected in a gas chromatography system. Peak area

resulted from SPME covered 2.83-5.35% peak area from syringe, however SPME had comparable ability to syringe in extracting volatile compounds. Five most common pyrazines in cocoa bean aroma were identified, such as 2 methyl pyrazine (2MP); 2,3 and 2,5-dimethyl pyrazine (DPM); and 2, 3, 5 trimethyl pyrazine (TrMP) and tetramethyl pyrazine (TMP). Other corresponding compounds were also detected in cocoa liquor, i.e. alcohols, carboxylic acids, aldehydes, ketons, esters, pyrazines, amines and other volatile compounds and strongly associated to chocolate aroma. The successful extraction of pyrazine and volatile-semi volatile compounds which contributed to chocolate aroma indicated SPME was applicable in flavor analysis.

137 NURDJANNAH, N.

Characteristic of pumpkin (*Cucurbita moschata*) ice cream using starch of maize (*Zea mays* L.) and arrowroot (*Maranta arundinacea* L.) as stabilizer. *Karakteristik es krim labu kuning (Cucurbita moschata) menggunakan pengemulsi pati jagung (Zea mays L.) dan pati garut (Maranta arundinacea L.)* / Nurdjannah, N.; Usmiati, S.; Budiyanto, A. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 43-52, 2 ill., 4 tables; Bibliography: p. 50-52

CUCURBITA MOSCHATA; PUMPKINS; ICE CREAM; CORN STARCH; ARROWROOT; STARCH; FRUIT PULPS; FLAVOUR; EMULSIFIERS; FOOD TECHNOLOGY.

Beside a high content of β-carotene, pumpkin also has a pleasant f1avor. In order to diversify pumpkin product, the observation of pumpkin as usage a source of vitamin (β-carotene) and flavoring enhancer along with maize (*Zea mays* L.) and arrowroot (*Maranta arundinacea* L.) starch as emulsifier in ice cream making was done The aim of the research was at finding out the physical properties and palatability of ice cream made from puree of pumpkin (*Cucurbita moschata*) as the β-carotene source and flavour enhancer, and the addition of maize and arrowroot starch as emulsifier. The research was designed using completely randomized block design (CRBD) factorially pattern 3x2 with 3 replications i.e: (i) three concentration levels of pumpkin puree (50%, 55%, 60%), and (ii) two kinds of emulsifier (maize and arrowroot starch). Parameters observed were physical properties of ice cream covering: overrun (%) and melting rate (minute/100 g), and the quality of organoleptic including taste and texture using hedonic method by 15 semi-trained panelist with five rank (1 = very unlike, 2 = rather unlike, 3 = like, 4 = rather like, 5 = like verymuch). Research results indicated that the use of pumpkin puree with the addition of maize and arrowroot in ICM (Ice Cream Mixture) influenced the overrun percentage and melting rate, but did not give effects on taste and texture. The use of pumpkin puree 60% and addition of maize starch produced the highest ice cream overrun and lowest melting rate, high β-carotene content (12.45 i g/g), with taste and texture most preferred by panelist. The use of maize starch as emulsifier in ice cream making was better than that of arrowroot starch.

138 SUARNI

Utilization of maize flour for corn stick cracker production. *Teknologi pemanfaatan tepung jagung untuk pembuatan emping stik* / Suarni (Balai Penelitian Tanaman Serealia, Makassar (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 23-31, 1 ill., 6 tables; 39 ref.

CORN FLOUR; MODIFIED STARCHES; FOOD TECHNOLOGY; ORGANOLEPTIC PROPERTIES; PROXIMATE COMPOSITION.

Corn stick is made from maize using a processs modified from melinjo (*Gnetum gneman*) chip processing chip was carried out at the Laboratory of Food Processing and Chemistry of Research Institute for Cereals and Laboratory of Chemistry of Indonesian Centre for Agricultural Posharvest Research, Bogor, using completely randomized design. Treatments consisted of two factors, i.e. corn varieties (Anoman-l, Local non waxy Soppeng and waxy local Soppeng) and steaming time (20, 30, 40 minutes) with three replications. Organoleptic test on taste and crispiness showed that panelists prefered Waxy- local variety with dough steaming of 20 minutes, while the result on color parameter, panelists choice was the Anoman-l variety with 30 minutes dough steaming. Steaming time did not influence chemical composition of corn flour except amylum content. Amylum content of Local Waxy variety was only 3.4% and its gelatinization was 14.5 minute at 51.76°C.

139 SUARSANA, I N.

Optimizing biosynthesis of tempeh isoflavone aglicone and effect of heating on consentration and antioxidant activity. ***Optimasi biosintesis isoflavon aglikon tempe dan pengaruh pemanasan terhadap konsentrasi dan aktivitas antioksidan*** / Suarsana, I N. (Universitas Udayana, Denpasar (Indonesia). Fakultas Kedokteran); Priosoeryanto, B.P.; Wresdiyati, T.; Bintang, M. [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 342-351, 2 ill., 2 tables; 19 ref. 633.31/.4/SEM/a

SOYFOODS; HEATING; ANTIOXIDANT ACTIVITY; BIOSYNTHESIS; ISOFLAVONES.

During the fermentation process, various soy chemical changes occurs by of microorganisms activity that produce bioactive, especially isoflavones. The objectives of this research were to find out optimalization of aglycone isoflavone biosynthesis during the tempeh fermentation and influence of heating on the concentration and its antioxidant activity. Optimazing of the aglycone isoflavones biosynthesis by fermentation of tempeh made from local soybean (Burangrang) using *R. oryzae* and *M. luteus oryzae* ATCC 9341 with various concentrations (tempe B). Tempeh fermented using *R. oryzae* only (tempe A) was used as control. The tempeh B was subjected to cooking process by frying use palm oil at 180°C for 5 minute and boiling at 98°C for 30 minute. Isoflavone compound was analyzed by HPLC method and antioxidant activity test at four concentrations, 100, 200, 300, and 400 ppm *in vitro* with measuring induction time to analyzed by equipment rancimat. The results showed that with the addition of *M. luteus oryzae* ATCC 9341 to optimalization of the aglycone isoflavone compounds biosynthesis (factor-2, daidzein, glisitein, and genistein) had increased compared with only tempeh fermented with *R. oryzae*. Cooking processes decreased isoflavone content of tempeh. Frying of Tempeh B reduces its isoflavone content by 39.15%, whereas boiling of tempeh B reduces its isoflavone content by 18.20%. The result of activity antioxidant test indicated that isoflavone extract of tempeh at dose of 300 ppm showed a high antioxidant activity which was similar to 200 ppm BHT with the protective factor value of 2.35 and 2.39, respectively.

140 SUKARDI

[**Supplementation of antioxidant made from flour of deity leaf tuber and Siam gourd on biscuit**]. ***Suplementasi antioksidan dari tepung ubi dewa dan labu siam pada biskuit*** / Sukardi; Chisnaulin, L.A.A. (Universitas Muhammadiyah, Malang (Indonesia). Jurusan Ilmu

Teknologi Pertanian). [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 588-598, 8 ill., 1 table; 12 ref. 633.31/.4/SEM/a

SECHIUM EDULE; BISCUITS; FOOD PROCESSING; MOISTURE CONTENT; PROTEIN CONTENT; CARBOHYDRATE CONTENT; ANTIOXIDANTS; ORGANOLEPTIC PROPERTIES.

Deity leaf tuber (*Gynura procumbens* Lour. Merr.) has neutral taste and low glycemic index, and sources of healthy food, specially for the prevention of diabetes mellitus disease. Siam gourd (Sechium edule) is known as vegetable that contain high fiber content. The objective of research was to obtain formula of biscuit that content antioxidant and food fiber (*Dietary Fiber*) from deity leaf tuber and siam gourd. This research was using simple RCBD, consisted of 6 levels, with 3 replications, i.e. (P0): wheat flour: flour of deity leaf corm: flour of siam gourd = 100% : 0% : 0%, (P1): wheat flour: flour of deity leaf corm: flour of siam gourd = 80% : 0% : 20%, (P2): wheat flour: flour of deity leaf corm: flour of siam gourd = 80% : 20% : 0%, (P3): wheat flour: flour of deity leaf corm: flour of siam gourd = 50% : 10% : 40%, (P4): wheat flour: flour of deity leaf corm: flour of siam gourd = 50% : 20% : 30%, (P5): wheat flour: flour of deity leaf corm: flour of siam gourd = 50% : 30% : 20%. Different flour substitution showed significantly influence the nutrient value and hardness; and score of organoleptic (taste, preference, and performance) of biscuit. It concluded that treatment P3 (wheat flour 50%, flour of deity leaf corm 30%, and flour of siam gourd 20%) was able to improve antioxidant activity and fiber of biscuit with water content 2.5%, protein 5.9%, total sugar 19.5%, fiber 3.4%, activity of antioxidant 8.9%, and organoleptic test for taste score was 3.2 (neutral), preferred score 3.5 (like).

141 UTOMO, J.S.

Physical and chemical characteristics of four commercial sweet potato cultivars in Malaysia. ***Sifat fisik dan kimia 4 varietas ubi jalar di Malaysia*** / Utomo, J.S. [Technological innovation acceleration supporting production increase of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 570-579, 6 tables; 26 ref. 633.31/.4/SEM/a

SWEET POTATOES; VARIETIES; STEAMING; CHEMICOPHYSICAL PROPERTIES; MOISTURE CONTENT; TEXTURE; CARBOHYDRATE CONTENT; STARCH; MALAYSIA.

In term of supporting of diversification on sweet potato (SP) basic food, 4 commercial sweet potato (SP) cultivars in Malaysia were studied. The variation of moisture content was happened during steaming. Increasing of moisture content occurred in White, Yellow and Purple cultivars, while it decreased in Orange cultivar. Moisture content negatively correlated with hardness and chewiness of steamed tubers. Starch content significantly affected the physical characteristics of SP tubers. SP containing high starch showed high hardness and chewiness, but low in springiness values. The differences in amylose content caused variation in starch pasting properties. Starch with high amylose content produced low gelatinization temperature and high setback viscosity. Among all sugars obtained in fresh SP

tubers, sucrose showed the highest amount, followed by glucose, fructose and maltose. Different characteristics of these four commercial SP cultivars would dictate their utilization as food ingredient.

142 WANITA, Y.P.

Processing technology development of kerandang (*Canavalia virosa*) yoghurt and its effort analysis. *Pengembangan teknologi pengolahan yoghurt kerandang (Canavalia virosa) dan analisa usahanya* / Wanita, Y.P.; Djaafar, T.F.; Purwaningsih (Balai Pengkajian Teknologi Pertanian Maluku, Ambon (Indonesia)). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia). ISSN 1410-959X (2011) v. 14(3) p. 151-159, 7 tables; 18 ref.

CANAVALIA; PROCESSING; FOOD TECHNOLOGY; YOGHURT; FERMENTATION; ORGANOLEPTIC ANALYSIS; CHEMICOPHYSICAL PROPERTIES; CHEMICAL COMPOSITION; COST BENEFIT ANALYSIS.

Kerandang (*Canavalia virosa*) is one of the agricultural commodities grown in the land of sand beach in Yogyakarta, but the utilization is not optimal because it only fed to livestock when the protein content of the seeds reached 37%. This study was aimed at (1) producing a form of refined products kerandang yoghurt; (2) knowing the physicochemical characteristics; and (3) acceptance of kerandang yoghurt panellists as well as economic analysis processing. The experiment was conducted in the Postharvest Laboratory, Yogyakarta AIAT in March-July 2009. Experimental design used was randomized completely design with two factors and four replications. The first factor was the dilution of kerandang cider (eight and ten times the kerandang weight) and the second factor was the percentage of sugars added (5% and 10% of the volume of kerandang juice after dilution). The results showed that the kerandang yoghurt preferred was yoghurt made with dilutions of 1:10 and sugar added 10% (P2Y). This yoghurt had a pH of 4, the levels of lactic acid 2.16% and 34.09 ppm HCN levels that were safe for human consumption. Kerandang processing into yoghurt was quite profitable with R/C ratio value of 1.59.

143 WIDYOTOMO, S.

Development of mathematic model for coffee decaffeination with leaching method. *Pengembangan model matematik laju penurunan kafein dalam biji kopi dengan metode pelindian* / Widyotomo, S.; Purwadaria, H.K.; Syarief, A.M. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Jurnal Penelitian Kopi dan Kakao* (Indonesia). ISSN 0215-0212 (2011) v. 27(2) p. 109-129, 14 ill., 3 tables; 32 ref.

COFFEE; CAFFEIN; DECAFFEINATION; LEACHING; EXTRACTION; MATHEMATICAL MODELS.

A simple mathematic model for caffeine kinetic description during the extraction proces (leaching) of coffee bean was developed. A non-steady diffusion equation coupled with a macroscopic mass transfer equation for solvent was developed and solved analytically. The kinetic of caffeine extraction from coffee bean is depend on initial caffeine content, final caffeine content, caffeine content at certain time, mass-transfer coefficient, solvent volume, surface area of coffee beans, process time, radius of coffee bean, leaching rate of caffeine diffusivity, solvent concentration, activation energy, temperature absolute and gas constant. Caffeine mass diffusivity was estimated by fitting the model to an experiment using acetic acid and liquid waste of cocoa beans fermentation. The prediction equation for leaching rate of caffeine in coffee beans has been found. That Dk (m^2/sec)= $1.345x10^7$-$4.163x10^7$, and Kl

(m/sec)= $2.445x10^5$-$5.551x10^5$ by acetic acid as solvent depended on temperature and solvent concentration. The prediction equation for length of time to reduce initial caffeine content to certain concentration in coffee beans had been developed. Caffeine diffusivity (Dk) and mass-transfer coefficient (Kl) was found, i.e. $1.591x10^7$-$2.122x10^7$ m^2/sec and $4.897x10^5$-$6.529x10^5$ m/sec, respectively using liquid waste of cocoa bean fermentation as solvent which depended on temperature and solvent concentration.

144 YULIFIANTI, R.

Physical characteristics of edible film derived from selected root starches with the addition of plasticizer. ***Karakteristik fisik edible film beberapa pati umbi-umbian dengan penambahan plasticizer*** / Yulifianti, R.; Ginting, E. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). [Technological innovation acceleration supportincrease of legumes and tuber crops: proceedings of the national seminar on research results of legumes and tuber crops], Malang (Indonesia), 21 Dec 2009 / Widjono, A.; Hermanto; Adie, M.M.; Prayogo, Y.; Suharsono; Sholikin; Rahmianna, A.A.; Nugrahaeni, N.; Saleh, N.; Kasno, A.; Subandi; Marwoto (eds.). Bogor (Indonesia): Puslitbangtan, 2011: p. 580-587, 2 tables; 13 ref. 633.31/.4/SEM/a

TUBERS; FOOD PROCESSING; SORBITOL; STARCH; EDIBLE FILMS; CHEMICOPHYSICAL PROPERTIES.

Study on producing edible film using starch sources and the addition of plasticizer was conducted in Chemical Laboratory and Food Technology, Indonesian Legumes and Tuber Crops Research Institute (ILETRI), Malang. The sources of starches were cassava, *Cana edulis*, sweet potato, arrowroot, and plasticizer were glycerol and sorbitol. The observation consisted of chemical properties of 4 starches and physical characteristics of edible film. Study showed that there was interaction among the extract types with the plasticizer on color, elongation, and tensile strength. Yet, they did not give any significant influences on the thickness of edible film. The addition of sorbitol on arrowroot seem to give higher brightness on color for about 81.7%, 0.33 mm thickness, tensile strength for about 1.73 N, and elongation for about 2.6%, however no significant influenced on the addition of glycerol on the brightness color for about 80.9%, tensile strength 1.45 N, and elongation 2.5%. Whereas cassava starch, adding glycerol had shown higher result compared to the adding of sorbitol, with the brightness level for about 81.5%, tensile strength 0.88 N, and elongation 2.0%.

Q04 FOOD COMPOSITION

145 AGUS

Decision support system for determining the quality of corn by using digital image processing and artificial neural network. ***Sistem penunjang keputusan untuk menentukan kelas mutu jagung dengan menggunakan teknologi pengolahan citra digital dan jaringan syaraf tiruan*** / Agus; Supriatna; Soemantri; Abubakar (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 53-63, 7 ill., 6 tables; 18 ref.

MAIZE; PROCESSING; QUALITY; SIMULATED FOODS; IMAGE PROCESSING; DIGITALS; NEURAL NETWORKS.

Food and feed industries that use corn as main raw material are growing rapidly. However, industrial development is not supported with the quality of raw material. Currently grain quality assessment is done conventionally by a experienced assessor and it has some weaknesses such as: (1) subjectivity factor that causes different result among analysts; (2) physical exhaustion when the analysts work too long resulted in inconsistend results and (3) need longer observation. In relation to these problem, a method for identifyng the quality of corn fastly, accurately and easily operated is required to create the efficiency of identification of the physical quality of corn. This research was aimed at creating a decision support system for determination the quality grade of corn using was digital image processing technology and artificial neural network. The results showed that digital image processing was able to generate numerical data such as physical properties of corn. Image characteristics of corn such as R, G, Band HSI showed unique values and unoverlapped averages facilitating the training process, as well as determining the physical properties such as area value, circumference and length of each grain of corn. A back progation model of Artificial Neural Network model was developed 10 input layers, 20 hidden layers and 4 output layers. The highest results was obtained from the 40000th training with and the accuracy of 98%, consisting of 100% whole grain, 98% damaged grains, 98% broken grains and 96% moldy grain. While the validation process produced 92% accuracy, consisting of 97% whole grain, 94% damaged grains, 88% broken grains and 87% moldy grain. Decision support systems that have been developed could be further implemented in the form of CDs, for easy use.

146 HERAWATI, D.

Heat moisture treatment modified sago starch for quality improvement of sago bihon. ***Pati sagu termodifikasi HMT (Heat moisture-treatment) untuk peningkatan kualitas bihun sagu*** / Herawati, D.; Kusnandar, F.; Sugiono (Institut Pertanian Bogor (Indonesia). Fakultas Teknologi Pertanian); Thahir, R.; Purwani, E.Y. *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 7-15, 2 ill., 9 tables; 16 ref.

SAGO; STARCH PRODUCTS; NONCEREAL FLOURS; MODIFIED STARCHES; INTERMEDIATE MOISTURE FOODS; PROCESSING; QUALITY; CHEMICOPHYSICAL PROPERTIES.

Native sago starch has A type gelatinization profile (high peak viscosity and followed by fast thinning during heating). HMT (heat-moisture treatment) can alter the sago starch gelatinization profile from A type to C type (no peak viscosity and no breakdown during heating), so the modified sago starch can be used for bihon-type noodle. The objectives of this research were to: (1) obtain optimum condition of HMT to produce modified sago starch with C type gelatinization profile and (2) obtain modified sago starch substitution level to improve sago bihon-type noodle quality. Sago starch was adjusted to 26-27% moisture content and exposed to HMT at 110°C for various times (4.8 and 16 hours) with washing or without washing treatment. HMI modified sago starch was analyzed for gelatinization profiles. The modified starch with C type gelatinization profile was characterized and formulated into bihon-type noodle. HMT substituted bihun-type noodle was analyzed for cooking loss, cooking time, texture (texture analyzer method) and sensory quality. HMT sago starch with 4 hours at washing treatment showed C type pasting profile and larger granule size, larger gel strength, lower degree of whiteness, lower syneresis and lower starch content than those of native sago starch. The substitution of native sago starch with 50% HMT sago starch improved the characteristic of sago bihon-type noodle quality, i.e. lower cooking time, higher hardness and better sensory quality in term of hardness, chewiness, stickiness and overall acceptability.

147 SETYADJIT

Performance of naringinase and CMC on debittering citrus siam juice. *Kinerja enzim naringinase dan CMC dalam mengurangi tingkat kepahitan jus jeruk siam* / Setyadjit (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 32-42, 5 ill., 22 ref.

CITRUS FRUITS; FRUIT JUICES; CARBOXYMETHYL; CELLULOSE; PH; VISCOSITY; ENZYME ACTIVITY.

To debitter the citrus siam juice, naringinase and CMC have been applied into the juice. Naringinase of various concentration up to 1 g/l with incubation time up to 4 h at 30°C reduced concentration of naringin up to 50%. Optimum concentration was 1 g/l for 3 h. CMC of various concentration up to 0.3% reduced the naringin content up to 10%. Hawever, the pH and viscosity were increased affected by the treatment but not total acidity, vitamin C and pH. At combination 1 g/l enzim for 3 h followed by CMC up to 0.3% were able to reduce the naringin concentration up to 30% left over. There is an indication of synergistic effect. Recommended treatment was 1 g/l naringinase for 3 h at 30°C followed by addition of 0.2% CMC, since above the level the juice taste has been imparted.

148 SISWANTORO

Mathematical modeling to know change of parameter quality of crisply fries sand during recondition. *Pemodelan matematik untuk mengetahui perubahan parameter mutu kerupuk goreng pasir selama rekondisi* / Siswantoro (Universitas Jenderal Soedirman, Purwokerto (Indonesia). Fakultas Pertanian); Rahardjo, B.; Bintoro, N.; Hastuti, P. *Jurnal Enjiniring Pertanian* (Indonesia). ISSN 1693-2900 (2010) v. 8(2) p. 105-112, 5 ill., 4 tables; 13 ref.

SNACK FOODS; FRYING; MATHEMATICAL MODELS; SAND; FOOD QUALITY; MOISTURE CONTENT.

Frying with sand as heat transfer media has interesting phenomenon to be experimented scientifically, especially related to change of product quality parameter during recondition. At this research, recondition is an action to return condition of product experiencing degradation of quality (mlempem) returns like condition when crisply completed is fried. Parameter quality of crispy which evaluated during recondition covers water content, stress, and strain. The purpose of this research was to develop mathematical model of changing product quality parameter (moisture content, stress, and strain) during recondition. Research was done with experiment of laboratory, applies research material of crisply as product sample fried with sand. Equipments applied consisted of equipments to measure stress and crisply strain (universal of testing machine), oven, analytical balance, fryer machine with sand, tachometer, hygrometer, thermocouple, data logger, interface, and computer. From result of research it is obtained that, error of prediction value and deviation standard applies mathematical model was smaller than 10%. Result of this experiment indicates that mathematical model which has been developed has level of accuracy for good enough prediction.

149 YULIANTI, R.

Physical characteristics of edible films derived from tuber crop starches with addition of plasticizers. *Perbedaan karakteristik fisik edible film dari umbi-umbian yang dibuat dengan penambahan plasticizer* / Yulianti, R.; Ginting, E. (Balai Penelitian Tanaman

Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Jurnal Penelitian Pertanian Tanaman Pangan* (Indonesia). ISSN 0216-9959 (2012) v. 31(2) p. 131-136, 1 ill., 2 tables; 32 ref.

CASSAVA; SWEET POTATOES; ARROWROOT; CANNA EDULIS; STARCH; EDIBLE FILMS; ADDITIVES; CHEMICOPHYSICAL PROPERTIES.

Starch is suitable for edible film, although the film produced is brittle. A study on preparation of edible film from starches of four tuber crops with the addition of plasticizers was conducted at the Chemical and Food Technology Laboratory, of the Indonesian Legumes and Tuber Crops Research Institute (ILETRI), Malang, from March to July 2009. The trial was arranged in a randomized completely design with three replications. The first factor was four difference tuber crops (cassava, edible canna, sweet potato, and arrowroot) and the second factor was two kinds of plasticizers (glycerol and sorbitol, each at a concentration of 2% v/w starch). Observations were done on chemical and physical properties of the starches as well as physical characteristics of the edible film produced. Results showed that the interactions between starches and plasticizers significantly influenced colour, tensile strength, and elongation of the edible film. However, the effect of plasticizer on thickness of the edible film was not significant. Arrowroot and cassava starches that have the highest whiteness levels produced edible films with the highest brightness values (L*). Edible films from the four tuber crops starches had similar thickness (0.02-0.03 mm). The arrowroot starch added with either sorbitol or glycerol produced edible films with the highest values of tensile strengh and elongation (1.7 N and 2.6%, and 1.5 N and 2.6%, respectively), indicating for good physical performances of edible films. These characters were followed by starch of sweet potato that was treated with sorbitol or glycerol.

Q60 PROCESSING OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS

150 HARIMURTI, N.

Optimization of methanolysis of *Jatropha curcas* L. crude oil applying response surface methodology. *Optimasi proses metanolisis dalam minyak jarak pagar (Jatropha curcas L.) dengan metode permukaan respon* / Harimurti, N.; Sumangat, D.; Haliza, W.; Risfaheri (Balai Besar Penelitian dan Pen gembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia). ISSN 0853-8212 (2010) v. 7(1) p. 16-22, 2 ill., 7 tables; 13 ref.

JATROPHA CURCAS; OILS; PETROLEUM; METHANOL; BIOFUELS; OPTIMIZATION METHODS.

Jatropha oil posseses total calorific value which is not significantly different from conventional petroleum diesel. However, its high viscosity makes it difficult to be used directly as fuel. The oil has to be converted into methyl ester through methanolysis (transesterification) process before it could be used effectively to substitute diesel fuel. The aim of this research was at finding the optimum condition of the methanol molar ratio to oil and reaction time (duration of transesterification process) on the methyl ester yield and the characteristics of methyl ester especially viscosity and acid number. Optimization was conducted using Respon Surface Method. Factors tested in this experiment were molar ratio of methanol 10 jatropha oil (5:1 and 7:1), and reaction times (50 minutes and 120 minutes). Transesterification process was conducted at 60°C in a reactor equipped with stirrer 600 RPM using KOH 0.5% of oil volume as catalyst. Parameters observed were methyl ester content (indicating percentages of methyl ester yield), kinematic viscosity and acid number.

Optimum conditions was achieved at molar ratio 6.6:1 and reaction time 60 minutes. At these optimum points, the characteristics of methyl ester were as follow: percentage of methyl ester yield 99.192%, kinematic viscosity 4.167cSt and acid number 0.112 mg KOH/g oil. These values met the Indonesian National Standard of biodiesel (SNI 04-7102-2006).

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